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THESIS

**ANALYSIS OF THE MARINE CORPS
EDUCATIONAL TIER SYSTEM**

by

Andrew L. Holmes

March 2013

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13. ABSTRACT

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Model results show that educational tiers are inaccurate at predicting first-term and fleet attrition among certain educational credentials and demographics. The model also shows that the tiers become less accurate once the home school education credential is moved to Tier I status. Similarly, the results demonstrate that there are different factors that predict first-term attrition when compared with the survivors of boot camp who attrite after reaching the fleet. Results also show that gender, dependency status, and educational credentials are all significant factors in predicting first-term and fleet attrition.

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ANALYSIS OF THE MARINE CORPS EDUCATIONAL TIER SYSTEM

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LIST OF ACRONYMS AND ABBREVIATIONS

AFQT   Armed Forces Qualification Test
ASVAB   Armed Services Vocational Aptitude Battery
AVF   All-Volunteer Force

CHSPE   California High School Proficiency Examination

DEP   Delayed Entry Program
DoD   Department of Defense

EAS   End of Active Service
EBIS   Educational and Biographical Information Survey

FY   Fiscal Year

GAO   General Accounting Office
GED   General Educational Development

HSDG   High School Diploma Graduate
HumRRO   Human Resources Research Organization

JAMERS   Joint Advertising, Market Research and Studies

MCRC   Marine Corps Recruiting Command
MCT   Marine Combat Training
MLE   Maximum Likelihood Estimation
MOS   Military Occupational Specialty

NHSG   Non-High School Graduate
NPS   Non-Prior-Service

OEF/OIF   Operation Enduring Freedom and Operation Iraqi Freedom

SOI   School of Infantry

TFDW   Total Force Data Warehouse

VEERP   Volunteer Enlisted Early Release Program

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I.   INTRODUCTION

In today's Marine Corps, a great amount of effort and manpower are expended to recruit, equip and train Marines efficiently for combat. As a nation that has been involved in two major military conflicts in the past 10 years, the amount of fiscal strain it costs for a country to engage in such protracted conflicts is readily apparent. In addition to the sheer manpower required to maintain a large fighting force such as the Marine Corps, it takes ingenuity and motivation to operate the sophisticated and technologically advanced systems currently used.

Each year, Congress sets the end strength for the Marine Corps. Through recruiting efforts, the Marine Corps uses accessions to meet and maintain that end strength goal. Historically, the Marine Corps has accessed between 30,000 and 40,000 non-prior-service (NPS) enlisted recruits annually.[1] (See Figure 1)
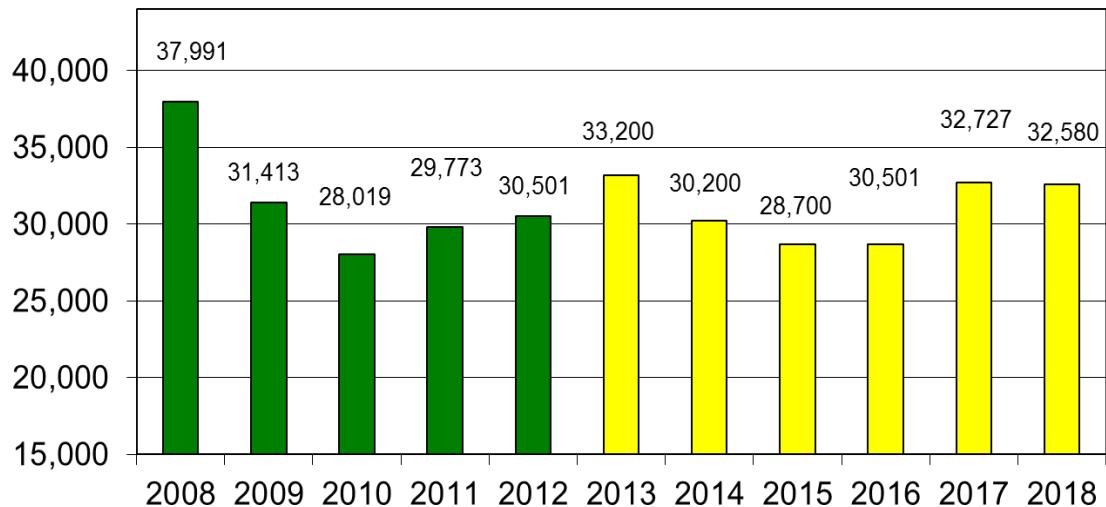
Source: Commander, *Marine Corps Recruiting Command, Fiscal Year 2012 Recruiting Report* (Quantico, VA: Commander, Marine Corps Recruiting Command, 2012).

Figure 1.   USMC Non-Prior Service Recruits: FY 2008 to FY 2012, FY 2013 to FY 2018 (projected)

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[1] Commander, *Marine Corps Recruiting Command, Fiscal Year 2012 Recruiting Report* (Quantico, VA: Commander, Marine Corps Recruiting Command, 2012).

The number of targeted accessions in a given year always depends on two specific numbers. The first number that determines required accessions is the end-strength level set for the current fiscal year. The second number that determines the Marine Corps required accession is the number of losses from the previous year, such as attrites and retirees. Variables, such as the state of the economy, military compensatory levels, and civilian compensation also play major roles in predicting annual accessions and retention numbers. Unlike other military services, the Marine Corps maintains a large first-term force. First-term attrition losses have averaged between 40 percent and 56 percent of the Marine Corps' total losses in the past decade.[2] Unfortunately, the Marine Corps is forced to expend tens of millions of dollars annually to replace the number of recruits lost through premature separation. Premature separation is a valid concern because the Marine Corps does not receive the full value of its investment if an enlisted contract is not entirely fulfilled.

Since 9/11, attrition rates have steadily decreased as a result of various economic factors and initiatives aimed at reducing the loss of personnel during a recruit's first term. The Marine Corps successfully uses incentives, such as retirement transferability plans, bonuses, and faster promotions, to decrease its number of first-term losses. However, historical studies suggest that the Marine Corps would be able to cut significantly the fiscal waste created by first-term attrition with more effective tools for screening its applicants.

In 1959, Eli S. Flyer became the first researcher to discover the relationship between attrition and education credentials. The Marine Corps currently utilizes a three-tier educational system to screen prospective recruits. The United States Air Force first introduced this system to the Department of Defense in the 1980s. The three-tier system was then modified in the 1990s. That modification included a shift of adult education credentials from Tier II to Tier I as a result of political pressure from Congress.[3] As

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[2] Commander, *Marine Corps Recruiting Command*.

[3] Eli S. Flyer, *Factors Relating to Discharge for Unsuitability Among 1956 Airman Accessions to the Air Force*, WADC-TN-59-201 (Lackland AFB, TX: Personnel Laboratory, Wright Air Development Center, 1959), 15.

educational credentials continue to evolve, the three-tier system must continue to be flexible as more recruits obtain educational credentials from a wide array of educational sources.

A.   PURPOSE AND BENEFITS OF THIS STUDY

The primary purpose of this study is to evaluate the effectiveness of the current three-tier education system by analyzing first-term attrition trends and probabilities of the Marine Corps' enlisted personnel. Recognizing that background factors, such as education, can be highly correlated with attrition, those factors can be incorporated into the current system. That incorporation would lead to an improved tier education system equipped to predict attrition. An improved tier system would allow Marine Corps recruiters to focus their efforts on high quality applicants with the lowest probability of attrition.

A secondary purpose of this study is to analyze the educational credentials used by the Marine Corps to screen prospective enlistees. If new education credentials are identified that are highly correlated with first-term or delayed entry program attrition, the credentials can be added or shifted within the tier classification system to strengthen its predictability. If any aspects of the current screening system are determined to correlate poorly with attrition, recommendations can be made to reclassify these education credentials. These adjustments should ensure a reduction in fiscal waste caused by first-term attrition.

B.   RESEARCH QUESTIONS

Enlisted Marines serving under contract comprise a major part of the enlisted fighting force. Very few enlisted Marines choose to reenlist for another 4-year obligation once their initial contract term has expired. Once the Marine Corps trains and equips a Marine for an entire enlistment period, it is important that the Marine Corps receives the best return on its investment. One way for the Marine Corps recoup its investment is through the time served by a member. Consequently, common traits that lead to attrition should be identified and analyzed to determine a person's probability of serving a

complete term of enlistment. The primary research questions also address the use of fleet attrition to aid in predicting attrition once an enlistee graduates from boot camp. This will additionally assist in reducing the first term loss of enlisted Marines.

1.   Primary Questions

- How does educational tier classification affect the first-term attrition of Marine Corps accessions?

- How does educational tier classification affect the first-term attrition of Marine Corps accessions once they reach the Fleet?

- Would shifting the home school credential to educational Tier I affect the first-term attrition of Marine Corps accessions?

2.   Secondary Question

- What are some of the underlying issues and reasons why minorities attrite from the Marine Corps?

C.   ORGANIZATION OF THE THESIS

This thesis contains six chapters. Chapter II presents a comprehensive review of previous studies related to first-term attrition, USMC education credentials, and underlying issues that correlate with high levels of attrition. Chapter III describes the data and methodology used throughout the study. It also presents and discusses descriptive statistics from the dataset. Chapter IV describes the results of an analysis of Marine Corps first-term attrition. Probit regression models are used on five years of data to explain how educational credentials and background characteristics are predictors of first-term attrition. Chapter V analyzes fleet attrition on five years of data to explain how educational credentials and background characteristics are predictors of first-term attrition. Chapter VI presents a summary of the findings and provides recommendations for the Marine Corps and further research.

II.   LITERATURE REVIEW

Over the years, the U.S. military has used many different screening techniques to determine the qualifications and abilities of its enlisted applicants and potential draftees.[4] Given the harsh and rugged nature of enlisted service, the earliest standards focused simply on "youth and vitality."[5] As the required skills of the enlisted force expanded along with the technology of defense, so did the need for more precise methods of measuring the acquired knowledge, skills, and aptitudes of prospective recruits.

The present-day All-Volunteer Force (AVF) screens applicants for their medical and physical condition, age, citizenship status, number of dependents, credit and finances, criminal history, drug or alcohol use, as well as for their education and aptitude, which is determined by test scores on the Armed Services Vocational Aptitude Battery (ASVAB). More recently, military services have begun to experiment with other screening devices, such as personality tests and behavioral or biographical questionnaires.[6] Many of these screening processes are used to predict a military applicant's probability for successfully completing a first term of service. A recruit's failure to complete a first term of service is called "attrition," and it has been a defining factor in the way screening methods have been applied since the early 1950s.

A.   ATTRITION AND EDUCATION

Unfortunately, not all enlisted accessions are perfectly fit for the military way of life. Many of these recruits are not able to complete basic training and their first military occupational specialty (MOS) school. Even the enlisted recruits able to complete basic training and MOS school may fall victim to disciplinary infractions or perform very poorly in their job. These enlisted recruits are often promoted slowly and eventually exit

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[4] Thomas Trent and Janice H. Laurence, *Adaptability Screening for the Armed Forces* (Washington, DC: Office of the Assistant Secretary of Defense [Force Management and Personnel], 1993), 14.

[5] Maurice Matloff, *American Military History* (Washington, DC: Office of the Chief of Military History, U.S. Army, 1973).

[6] Jennie W. Wegner, *Expanding the Recruiting Market: Non-cognitive Testing* (Alexandria, VA: Center for Naval Analyses, 2010), 5.

service before their initial contract obligation. The early exit from initial service, also known as first-term attrition, is one of the most costly budget items in all four branches of the military. In 1991, using a 1989-dollar metric, adverse first-term attrition was estimated to be in the range of $200 million per year.[7] In 1998, the General Accounting Office (GAO) estimated that the average combined cost of basic and occupational training for each enlisted service member was approximately $35,532.[8] Based on standard inflation calculations, this cost would total more than $38,000 per enlistee in 2012, which provides some idea of the military's early investment in its recruits. These cost estimates do not account for the expense of recruiting the enlistee, which is significant, nor the turbulence and administrative costs caused by losing that enlistee and the need to find a replacement. In 1959, an Air Force Personnel Laboratory technical report by Eli S. Flyer concluded that the most effective way to predict first-term attrition and reduce premature discharges is to require that all new Air Force recruits possess a high school diploma.[9] This study was the first to draw a solid connection between attrition and education. Even though this pioneering study focused solely on the Air Force, by 1965, all services were analyzing the connection between education level and the probability of first-term attrition.

Education criteria were eventually combined with aptitude test scores for military screening.[10] Basically, to qualify for enlistment, applicants who did not possess a high school diploma were required to achieve a higher minimum score on the Armed Forces Qualification Test (AFQT) than those who graduated from high school or went on to higher education. This requirement, called the education differential, was first introduced by the Air Force in 1961, followed by the Army (1962), the Marine Corps (1965), the

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[7] Stephen Klein, Jennifer Hawes-Dawson, and Thomas Martin, *Why Recruits Separate Early* (R-3980-FMP) (Santa Monica, CA: RAND Corporation, 1991).

[8] U.S. Government Accounting Office, *Military Attrition: Better Data, Coupled with Policy Changes, Could Help the Services Reduce Early Separations* (GAO/NSAID-98-213), Washington, DC: GPO, 1998.

[9] Flyer, *Factors Relating to Discharge for Unsuitability Among 1956 Airman Accessions to the Air Force*, 15.

[10] Ibid., 4.

Department of Defense (DoD) (1965 under the draft), and the Navy (1972).[11] Flyer's actual recommendation was to ban high school dropouts completely from enlisting or being drafted, although such action would have been impractical and far too severe at the time for all but possibly the Air Force.[12]

By the early 1970s, coincident with the end of conscription, direct references to the General Educational Development (GED) certificate for high school equivalency began to appear in the official aptitude standards of the military services. For example, beginning in October 1972, the Navy began to differentiate its required minimum scores on the AFQT by High School Diploma Graduate, GED, and Non-High School Graduate.[13] It should be noted that, at the official start of the AVF in 1973, the military services continued to employ their own entry standards, as they still do currently. However, they were also using a variety of aptitude testing instruments with their own cut scores based on an applicant's education, which was often defined differently from service to service. In other words, in one service, a GED or similar equivalency certificate might be treated separately from high school graduation or non-graduation, while in another service; it could be treated as the practical equivalent of high school graduation. As the number and type of secondary credentials increased, and without some uniform method of defining them for enlistment purposes, the treatment of these credentials from one service to another might appear almost haphazard.

Meanwhile, attrition rates continued to rise without conscription due to changes in military separation policies for those who joined under strictly voluntary conditions. Generally, it became easier for enlistees to fabricate a reason for separation or to be discharged for good cause by the military branch. As it turned out, Flyer's findings from

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[11] Eitelberg, Laurence, Waters, and Perelman, *Screening for Service: Aptitude and Education Criteria for Military Entry*, Appendix A, 137–152.

[12] Janice H. Laurence, *Education Standards for Military Selection: From the Beginning* (Alexandria, VA: Human Resources Research Organization, 1984).

[13] Eitelberg, Laurence, Waters, and Perelman, *Screening for Service: Aptitude and Education Criteria for Military Entry*, 145.

decades earlier continued to hold true in the all-volunteer environment: on average, the attrition rates for high school graduates were half as large as the attrition rates for recruits who had dropped out of high school.[14]

In 1977, Cooper reevaluated Flyer's findings regarding the importance of a high school diploma and arrived at a similar conclusion. In fact, Cooper claimed that Flyer had possibly underestimated the importance of the diploma, as Cooper's own data showed that high school dropouts were three-times more likely to be discharged for "failure to meet minimum behavioral or performance criteria" during their first term of service.[15]

In this landmark study, Cooper also concluded that AFQT categories are a valuable predictor of a recruit's general trainability,[16] which was most apparent when education is combined with AFQT scores. For example, high school graduates in AFQT category IV (the lowest acceptable score range) were less likely to attrite than were non-high school graduates in AFQT categories I–III,[17] as seen in Table 1.

Table 1.   Percent of Enlisted Accessions Discharged for Failure to Meet Minimum Behavior or Performance Criteria by Education and AFQT Category: Fiscal 1971 Enlistees Separated As of June 20, 1973 (percent)

| | AFQT Category | | | |
Education	I–II	III	IV	All
High School Diploma Graduate (HSDG)	6.6	9.4	13.7	8.6
Non High School Graduate (NHSG)	20.7	24.5	26.8	24.6
All	*8.8*	*15.7*	*21.1*	*14.3*

Source: Richard V. L. Cooper, *Military Manpower and the All-Volunteer Force* (Santa Monica, CA: RAND Corporation, 1977), 129–130.

In the 1980s, two studies by Flyer and Elster expanded Flyer's original research on education and attrition to those who held a GED. It was no longer enough to evaluate

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[14] Richard V. L. Cooper, *Military Manpower and the All-Volunteer Force* (Santa Monica, CA: RAND Corporation, 1977), 129–130.

[15] Ibid., 140.

[16] Ibid.

[17] Ibid.

education based on high school graduation alone, given the rapidly widening use by young people of high school equivalency programs and other nontraditional avenues toward obtaining a high school credential. Flyer and Elster found that GED credential holders attrite at a rate twice as high as those with a traditional high school diploma.[18] Thus, the attrition rates of GED holders were roughly comparable to those of high school dropouts who did not possess a GED credential. The same result was found with GED holders who had completed Job Corps training.[19]

Flyer and Elster again extended their research to include married and unmarried recruits. They found that married recruits were more likely to attrite than were single recruits.[20] They also discovered that the attrition rate for recruits who enlisted at the age of 17 was higher than for recruits between the ages of 18–22. Further, recruits older than 22 years of age tended to experience higher attrition rates.[21] This finding was later confirmed by Buddin, who found that the probability of first-term attrition increased by one percent each year beyond the age of 17 years old at the time of enlistment.[22]

Flyer also conducted a study in 1984 that analyzed first-term attrition among enlisted personnel grouped by race/ethnicity. At this point relatively little research had been conducted to examine attrition by race or ethnicity. Indeed, certain ethnic identifiers were not even available in the Defense Department's automated databases until 1977. Among persons who entered the military from 1973 through 1979, Flyer found that Hispanic male recruits had lower attrition rates in all services and across all educational

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[18] Richard S. Elster and Eli S. Flyer, *A Study of the Relationship Between Education Credentials and Military Performance Criteria* (Monterey, CA: Naval Postgraduate School, 1982), II–25.

[19] Ibid., IV–3.

[20] Eli S. Flyer and Richard S. Elster, *First Term Attrition Among Non-Prior Service Enlisted Personnel: Loss Probabilities Based on Selected Entry Factors* (Monterey, CA: Naval Postgraduate School, 1983), 43.

[21] Ibid., 47.

[22] Richard Buddin, *Analysis of Early Military Attrition Behavior* (Santa Monica, CA: RAND Corporation, 1984), 23.

levels.[23] Also, attrition findings for Blacks in the Navy, Marine Corps, and Air Force were much higher for white and Hispanic recruits, with the largest disparity occurring in the Marine Corps.[24]

In 1990, Quester, North, and Kimble reported the results of research that built upon previous attrition studies from the preceding decade. The study by Quester and her associates was directly tailored to the United States Marine Corps, focusing on the characteristics of enlistees that make them good Marines.[25] Researchers measured success using three criteria: (1) completing a first-term of enlistment; (2) promotion to the rank of E-4; and (3) retention beyond the first term of service.[26] The findings in this study confirmed the findings of Flyer and Elster that first term recruits over the age of 20 years old are most likely to adapt successfully to the Marine Corps way of life. Other recruit characteristics associated with success across all three criteria were possession of a high school diploma, an AFQT score above the 50th percentile, postponing entry into active duty through the Delayed Entry Program (DEP), and meeting the in-service weight standard for one's height.[27]

More specifically, Quester et al. found that among overweight recruits, the probability of first-term attrition was 15 percentage points higher for those who were not overweight. Overweight recruits were also 7 to 16 percentage points less likely to reach the rank of E-4, and retention beyond the first term of enlistment was 7 percentage points lower for those recruits who met the weight standards for their height. Further, participation in the DEP increased a recruit's probability of successfully completing a first term of enlistment by 7 to 9 percentage points. Additionally, recruits over the age of 20 were considerably more likely than others to reach the rank of corporal within the first term of enlistment.

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[23] Eli S. Flyer, *First Term Attrition Among Enlisted Personnel Grouped by Racial/Ethnic Background* (Monterey, CA: BDM Corporation, 1984), 11.

[24] Ibid., 12.

[25] Aline O. Quester, James H. North, and Theresa H. Kimble, *Identifying Successful Marine Corps Recruits* (Alexandria, VA: Center for Naval Analysis, 1990), 5.

[26] Ibid.

[27] Ibid., 21.

In 2010, Quester analyzed the correlates of first-term attrition among recruits who entered the Marine Corps from 1979 to 2009. Quester found that first-term attrition rates had fallen in recent years. This drop in attrition can be seen in Figure 1, and it is more evident for women than for men.[28] For the most recent cohorts, attrition rates among women have averaged 34 percentage points higher than for their male counterparts. In earlier years, such as 1989, female attrition was almost 20 percentage points higher than the average rates for men.
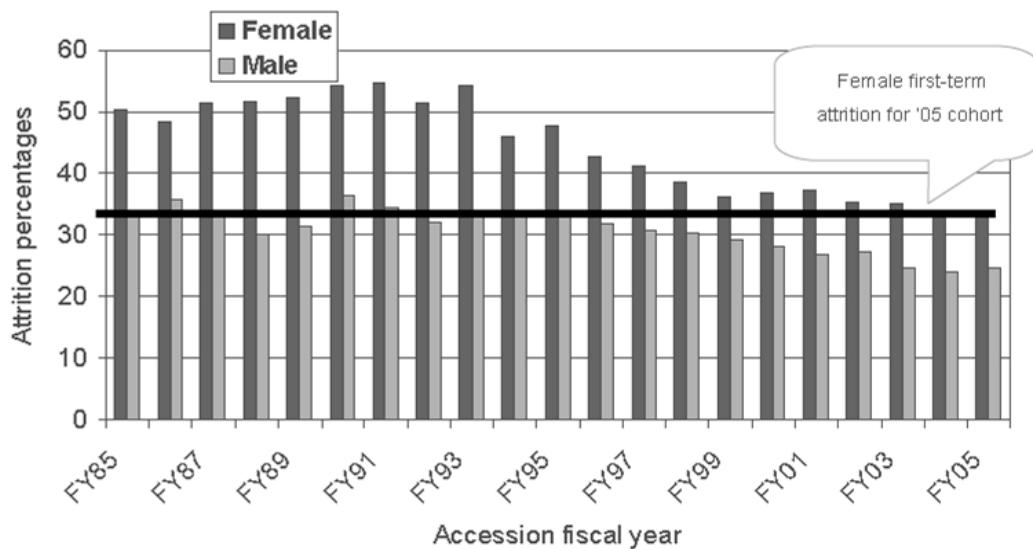
Source: Aline O. Quester, *Marine Corps Recruits: A Historical Look at Accessions and Bootcamp Performance* (Alexandria, VA: Center for Naval Analyses, 2010), 43.

Figure 2.   Male and Female First-Term Attrition Rates: 4-Year Obligors

Quester also examined long-term behavior among racial groups. As depicted in Figure 3, she found that 73-month continuation rates were highest for Black and Hispanic Marines. Moreover, the continuation rates for Black men were the highest of any racial/ethnic group. Continuation rates for Hispanic men were high, but generally below those for Hispanic women, non-Hispanic Black women, and Black men.[29]

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[28] Aline O. Quester, *Marine Corps Recruits: A Historical Look at Accessions and Bootcamp Performance* (Alexandria, VA: Center for Naval Analyses, 2010), 43.

[29] Ibid., 47.
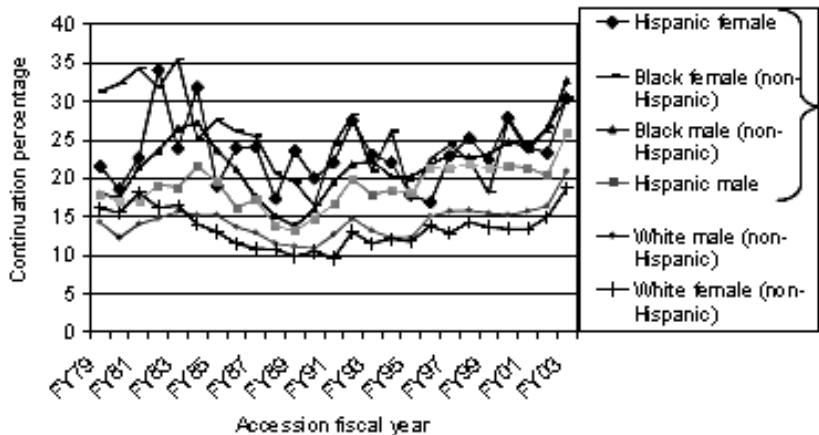
Source: Aline O. Quester, *Marine Corps Recruits: A Historical Look at Accessions and Bootcamp Performance* (Alexandria, VA: Center for Naval Analyses, 2010), 47.

Figure 3.   Street to Fleet: 73-Month Continuation Rates by Race/Ethnicity

B.   EDUCATION TIERS: SIMPLE IS NOT ALWAYS SIMPLE

As previously observed, the expanded use of secondary school educational credentials—along with no uniform standard for dealing with them—resulted in markedly different enlistment criteria from one military service to the next. For example, as seen in Table 2, in 1983, an applicant with a California High School Proficiency Examination (CHSPE) Certificate was treated as a high school graduate in the Air Force, but as a non-graduate in the three other services. (CHSPE recipients are often talented high school juniors who seek to skip their senior year and attend college.) Conversely, persons with a High School Attendance Certificate or a High School Completion Certificate were treated as a non-graduate in the Air Force and a graduate in the other three services.

Table 2.   Service Treatment of Secondary School Education Credentials for Enlistment Purposes During FY 1983, by Service

Secondary School Credential	Treatment for Enlistment Purposes*			
	Army	Navy	Marine Corps	Air Force
High School Diploma (State Accredited)	Grad	Grad	Grad	Grad
High School Diploma (Non-State Accredited)	Grad	Grad a	Grad	Non
High School Attendance Certificate	Grad	Grad	Grad	Non
High School Completion Certificate	Grad	Grad	Grad	Non
GED Certificate	GED b	GED b	Non	GED b
High School Diploma Based on GED	GED b	GED b	Non	GED b
Adult High School Diploma	Grad c	Grad d	Grad e	Grad f
California High School Proficiency Examination (CHSPE) Certificate	Non	Non	Non	Grad
Correspondence School	Grad g	GED	Grad g	Grad h

*Grad is high school diploma graduate. GED is high school equivalency. Non is non-high school graduate.

a Enlisted as high school diploma graduates on a case-by-case waiver basis.

b Enlisted under standards separate from both high school diploma graduates and non-graduates but reported as non-high school graduates.

c Enlisted as high school diploma graduates provided in the diploma was awarded or authorized by the state.

d Enlisted as high school diploma graduates provided that the program is recognized by the state.

e Only Individuals accessed as part of test programs (to determine success rates of adult high school programs) are enlisted as high school diploma graduate3; all others are enlisted as non-high school graduates.

f Enlisted as high school diploma graduates provided that the diploma was not Issued as a result of the GED test only.

g Enlisted as high school diploma graduates provided that the course/program is accredited by the National Home Study Council.

h Enlisted as high school diploma graduates provided that the school is accredited by the state or jurisdiction.

Source: Eitelberg, Laurence, Waters, and Perelman, *Screening for Service: Aptitude and Education Criteria for Military Entry*, 122.

At the Defense Department level, nineteen categories were developed to classify applicants for enlistment or recruits by their education level. These categories are shown in Table 3 and were intended to simplify treatment of secondary school credentials across the services.

Table 3.   DoD Wide Educational Coding System, 1983

1	Less than High School Diploma
7	Correspondence School Diploma
8	Completed One Semester of College
9	Currently in High School
B	Adult Education Diploma
C	Occupational Program Certificate
D	Associate Degree
E	Test-Based Equivalency Diploma
G	Professional Nursing Diploma
H	Home Study Diploma
J	High School Certificate of Attendance
K	Baccalaureate Degree
L	High School Diploma
M	Credential Near Completion
N	Master's Degree
R	Post Master's Degree
S	High School Senior
U	Doctorate Degree
W	First Professional Degree

Source: Trent and Laurence, *Adaptability Screening for the Armed Forces*, 21.

At the same time, a number of studies were undertaken to differentiate among these credentials and separate them by the predicted performance of recruits who possessed the credentials. In 1983, DoD contracted with the Human Resources Research Organization (HumRRO) to evaluate enlistment policies that affect secondary school credentials.[30] Data from the Educational and Biographical Information Survey (EBIS) indicated that alternative credential holders, on average, did not adapt as well as high school graduates to military life. Attrition rates, for example, were found to be considerably higher for credential holders than for recruits with a traditional high school diploma.[31] In another study at the Naval Postgraduate School (NPS), Franke explored the possibility of dividing education levels and credentials into separate categories by using

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[30] Trent and Laurence, *Adaptability Screening for the Armed Forces*, 16.

[31] Ibid., 22.

first-term attrition probabilities as a guide.[32] At the same time, Eitelberg recommended to the Office of the Secretary of Defense that these separate education groups be called "tiers" as a way to distinguish them from AFQT categories (and their component scores), which would undoubtedly would be used in combined form during enlistment screening.[33]

Research during this period consistently supported the findings of previous studies showing that, on average, the attrition rates of GED holders were closer to those of high school dropouts than to graduates.[34] Apparently, based on measures of military performance, the GED was less "equivalent" to a high school diploma than to no diploma at all. These research results supported creating two education categories or "tiers," divided by those who possessed a traditional diploma and those who did not, regardless of the GED. Although the research argued strongly for two tiers, it did not argue convincingly. Placing GED holders in a tier with non-graduates would essentially say that an important American institution, the Department of Defense, believes that a GED is not the practical equivalent of actually finishing high school with a traditional diploma. On the other side of the argument, GED Testing Service representatives charged that the DOD was not using the GED educational credential for what it was originally intended to do. According to the GED Testing Service, a GED credential was not designed to predict attrition.[35] The GED Testing Service claimed that enlistees with GEDs had comparable education skills to those of school graduates. In 1982, the Educational and Biographical Information Survey (EBIS) was asked to evaluate existing education enlistment policies. Once the EBIS results were published, it was discovered that, on average, enlistees with an alternative educational credential did not adapt to military life as well as enlistees with a traditional diploma. With pressure from the GED industry and other defenders of

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[32] David B. Franke, "An Evaluation of Marine Corps Educational Credentials" (master's thesis, Naval Postgraduate School, 1983).

[33] Memo from Professor Mark Eitelberg to Director, Accession Policy, Office of the Secretary of Defense, 1983. The term "tier" was chosen to differentiate it from AFQT "categories," which are used in reporting AFQT scores.

[34] Trent and Laurence, *Adaptability Screening for the Armed Forces*, 6.

[35] Ibid., 10.

equivalency certificates, GEDs were eventually singled out as a separate category with minimum aptitude test scores set between those of non-graduates and traditional graduates.[36]

In 1987, after considerable study and coordination with the military services, DoD introduced the tier classification system for educational credentials. The tiers were structured as follows.

Tier I: High School Diploma Graduate (HSDG)

Traditional high school graduates
Completed one Semester of College

Tier II: Alternative Credential Holder

Test-Based Equivalency Diploma
Adult Education Diploma
Correspondence School Diploma
Occupational Program Certificate
Home Study Diploma

Tier III: Non-High School Diploma Graduate (NHSDG)

In 1997, research by Laurence, Ramsberger, and Arabian examined yet again the first-term attrition rates of recruits with various education credentials and aptitude. The researchers found that, on average, recruits with an alternative education credential had an attrition rate of 35 percent, while those with a traditional diploma had a rate of 22.5 percent.[37] This study supported the tier system then in practice, except for adult education credential holders and persons without a traditional high school diploma who completed one semester of college.[38] Indeed, the results suggested that adult education holders and those with one semester of college should be in Tier II, rather than in Tier I, based on their performance and probability of first-term attrition.[39]

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[36] Trent and Laurence, *Adaptability Screening for the Armed Forces*, 7.

[37] Janice H. Laurence, Peter F. Ramsberger, and Jane M. Arabian, *Education Credential Tier Evaluation* (Arlington, VA: Human Resources Research Organization, 1997), 12.

[38] Ibid.

[39] Ibid., 13.

Thirty years after Flyer's original research connecting attrition to education, he conducted another comprehensive study using enlisted cohorts from 1980 through 1995. Similar to the study by Laurence et al. discussed above, Flyer found that recruits with an adult education diploma and those who were high school dropouts but attended one semester of college had first-term attrition rates high enough to argue against placing them in Tier I.[40] Flyer recommended that the credential holders of adult education and one semester of college be subject to increased screening to mitigate their attrition rates.

In 2004, a Naval Postgraduate School Master's thesis by Christopher Bownds studied attrition and education credentials to ascertain if the three-tier classification was outdated. In his study, Bownds confirmed the work of Laurence et al. and Flyer in finding that recruits with adult education credentials and those with one semester of college but no traditional high school diploma have attrition rates that do not justify their being placed in Tier I. Bownds recommended that these two education credentials be placed in Tier II because their attrition rates are more in line with Tier II and Tier III recruits.[41] Bownds then developed a screening matrix for analyzing incremental AFQT scores and educational credentials with a probable completion rate that would provide more accurate predictability.[42] This screening matrix can be seen in Figure 4.

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[40] Eli S. Flyer, *Educational Credentials and First-Term Attrition*, (Unpublished: Directorate for Accession Policy Office of the Assistant Secretary of Defense [Force Management], 2002), 1.

[41] Christopher D. Bownds, *Updating the Navy's Recruit Quality Matrix: An Analysis of Educational Credentials and the Success of First-Term Sailors* (master's thesis, Naval Postgraduate School, 2004), 41.

[42] Ibid., 53.
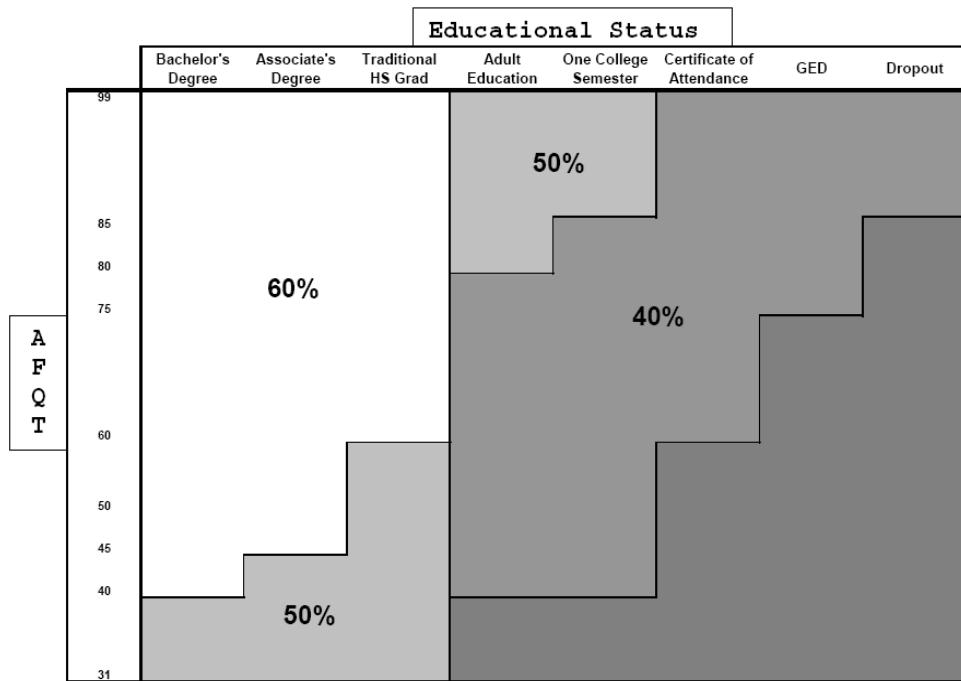
Source: Bownds, "Updating the Navy's Recruit Quality Matrix," 53.

Figure 4.   Predicted Probability of First-Term Completion by AFQT Score and Educational Status

A 2007 master's thesis by Jon K. Neuhalfen examined early attrition from the military by focusing on the DEP and Bootcamp training. Neuhalfen's study confirmed previous research showing that education credentials and AFQT scores are highly correlated with Bootcamp and DEP attrition. Similar to Bownds, Neuhalfen discovered the current screening system of tiers and AFQT scores are not as accurate as possible in predicting attrition.[43] Further, his findings included variables, such as married recruits, recruits without a job designation, and female recruits who had higher rates of attrition.

In 2009, another Naval Postgraduate School thesis by John J. Andrew studied the effects of educational credentials on first-term attrition in the U.S. Navy. Essentially, Andrew found that the current educational tier system is flawed with respect to education credential assignment and attrition predictability. Through a survival analysis, he also discovered different factors correlate with attrition during the first 90 days of

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[43] Jon K. Neuhalfen, "*Analysis of Recruit Attrition from the Navy's Delayed Entry Program and Recruit Training Command*" (master's thesis, Naval Postgraduate School, 2007), 135–139.

enlistment.[44] As a replacement to the current screening method, Andrew proposed three screening tables to improve the predictability of first-term attrition in the Navy. Interestingly, Andrew found that the demographic variable with the strongest correlation to first-term attrition was "single with dependents."[45]

Currently, the U. S. Marine Corps uses a combination AFQT scores and educational credentials to screen and determine an enlistee's eligibility for service, as well as any special enlistment programs or monetary bonuses. As seen in Table 4, an enlistee's education level is cross-tabulated with minimum AFQT and GT scores to qualify for enlistment.

Table 4.   Minimum Armed Forces Qualification Test (AFQT) Percentile Score and Education Tier Required for Enlistment Eligibility in the Marine Corps, Fiscal Year 2011

If an applicant is a:	Then the minimum AFQT score required is…	and the minimum GT score required is… (Not waiverable)
Tier I High School Graduate	21	80
Tier II Alternative Credential	31	90
Tier III Non-high school graduate	50	90
Tier I High School Senior	21	80

Source: Adapted from U.S. Marine Corps, Marine Corps Order P1100.72C, *Military Procurement Manual, Volume 2, Enlisted Procurement (Short title: MPPM ENLPROC)* (Washington, DC: U.S. Department of the Navy, 2004), 3.75.

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[44] John J. Andrew, "Improved Screening for Navy Enlistment" (master's thesis, Naval Postgraduate School, 2009), 63.

[45] Ibid., 66.

C.   UNDERLYING ISSUES THAT AFFECT ATTRITION

The U. S. Marine Corps and other services emphasize the importance of a high school diploma in predicting a recruit's adaptability to military life. However, even though the high school diploma is a strong predictor of first-term attrition, a number of other background or demographic factors tend to correlate with a person's likelihood of successful performance in service.

This section discusses external influences or underlying reasons for attrition across demographics. It is important to understand these other influences so that manpower administrators are better equipped to improve policy, procedures, and recruiting efforts to increase the quality of recruits.

a.   *Enlistment Standards*

Although the high school diploma is one of the most accurate predictors of first-term attrition, this factor has historically been one of the major disqualifiers for many Black and Hispanic youth who desire to serve in the military. Hispanic youth have much higher high school dropout rates than do white and Black youth. Given that approximately 95 percent of recruits are high school graduates, low graduation rates among certain demographics present a major obstacle for some youth.[46] For instance Hispanics have one of the lowest attrition rates among all other racial/ethnic groups. It is further shown in Quester's study for CNA that, once Hispanic enlistees enter the military they have a higher probability of completing their first term of enlistment and continuing service beyond their initial obligation.[47] If these enlistment standards are mitigated by extra screening efforts, then proportionately more persons in certain demographic groups may be able to enlist despite not having a high school diploma.

Another disqualifying factor that may affect first-term attrition differently for certain demographic groups is the military's height and weight standards. Hispanic

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[46] Nolan and Bicksler, *Minorities in the Enlisted Force: Is the U.S. Military Representative of the Nation It Defends?*, 22.

[47] Aline O. Quester, Marine Corps Recruits: A Historical Look at Accessions and Bootcamp Performance (Alexandria, VA: Center for Naval Analyses, 2010), 47.

and Black youth, on average, are more overweight than their white counterparts. Approximately 71 to 88 percent of Hispanic males and 69 to 86 percent of Black males meet the military's weight standards. By comparison, 79 to 91 percent of white males meet the military's weight standards. Thus it clear to see how the weight standard affects these racial/ethnic groups differently, yet, would it be possible to refine the standard or apply it in combination with other criteria, to achieve both lower attrition and improved fairness for racial/ethnic minorities who may be otherwise highly qualified to serve in the nation's military?[48]

b.   *Political and Economic Unrest*

The state of the civilian economy also has a strong impact on attrition rates. Historically, high-quality enlistments rise during periods of high unemployment because of the challenges youth face finding employment in the civilian sector.[49] A study by Armor and Gilroy found that the proportion of Black enlistees during periods of high unemployment actually declines during periods of high unemployment because of a "crowding out" effect by increased numbers of white youth seeking to join the military or remain in service.[50] Consequently, young men and women who are already serving in military become less likely to attrite or otherwise leave service for fear of not being able to provide for their families due to the relatively poor civilian job market.

c.   *Generational Influencers*

The parents and relatives of young people along with other adults in their lives, are especially influential when these young men and women are considering military enlistment. Many of the so-called "influencers," in recruiting jargon, were less prone to recommend military service during the height of the wars in Iraq and Afghanistan. For example, in 2003, 46 percent of white influencers indicated that they

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[48] Nolan and Bicksler, *Minorities in the Enlisted Force: Is the U.S. Military Representative of the Nation It Defends?*, 23.

[49] Ibid.

[50] Davis Armour and Curtis L. Gilroy, *Changing Minority Representation in the U.S. Military* (Armed Forces and Society, 2009), 223–246.

would recommend military service; by 2010, this figure had fallen to 33 percent.[51] Among Blacks, the likelihood of recommending military service dropped from 35 percent to 24 percent; and among Hispanics, the rate dropped from 49 percent to 32 percent.[52] As shown in Figure 10, a Joint Advertising, Market Research and Studies (JAMRS) poll reported a decline in parental support of youths' decisions to join the military from 70 percent in 2005 to 63 percent in 2008 among whites, and a drop from 62 percent to 56 percent among Blacks.[53] At the same time, the study reported a sizable increase in parental support among Hispanic households from 62 percent to 73 percent. Thus, it is easy to see how generational support can play an important role in military recruiting or enlistment outcomes, and this role may differ across demographic groups. In terms of attrition, one may speculate whether youth are generally less likely to stay in the military if their service is not fully supported by parents and other important influencers in their lives.
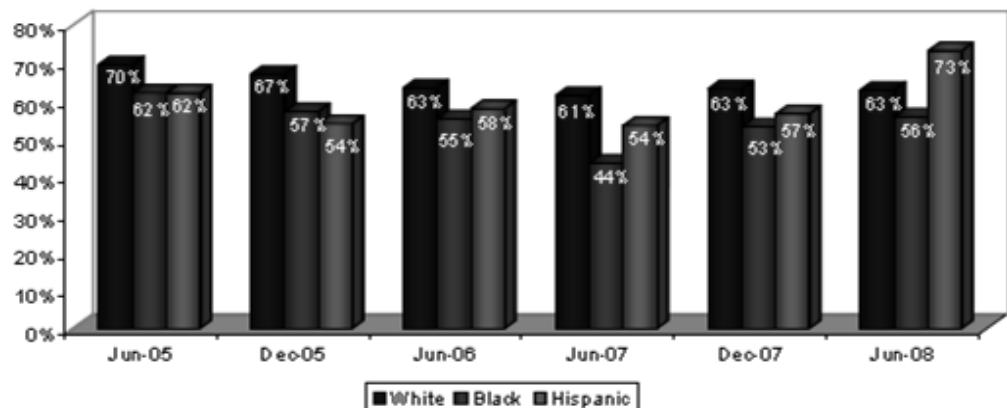
Source: Department of Defense, *Influencer Poll 10: Overview Report*, 19.

Figure 5.   Support of a Youth's Decision to Join the Military, by Race/Ethnicity
(% strongly support and somewhat support)

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[51] Nolan and Bicksler, *Minorities in the Enlisted Force: Is the U.S. Military Representative of the Nation It Defends?*, 25.

[52] Nolan and Bicksler, *Minorities in the Enlisted Force: Is the U.S. Military Representative of the Nation It Defends?*, 25.

[53] Department of Defense, *Influencer Poll 10: Overview Report* (Arlington, VA: Joint Advertising and Market Research and Studies Program, 2008), 19.

D.   THE WHOLE PERSON CONCEPT

While the high school diploma remains a strong predictor of first-term attrition, a number of additional background or demographic factors also correlate with a person's likelihood of successful performance in military service. These factors include non-cognitive characteristics that are predictors of first-term attrition. The use of non-cognitive factors during enlistment screening supports the notion of looking beyond narrow criteria and taking into account the "whole person."

a.   *Non-Cognitive Measures*

Non-cognitive attributes pertain to an individual's emotional and volitional processes such as behavior, personality, motivation, and interest. These traits are subjective and are difficult to capture due to their qualitative nature. Although non-cognitive testing is not a perfect science, when applied correctly, it can be an accurate predictor of first-term attrition. One important purpose for non-cognitive testing is to identify prospective enlistees who may fall into a high-risk category, such as high school dropout, but still possess a strong ability to succeed in the military based on other personal attributes. This would allow the military to pursue individuals with intangible assets and qualities actively who significantly increase their likelihood of successfully adapting to military life. With high dropout rates among certain demographics, non-cognitive measures provide a way the military can expand the number of prospective enlistees. The U.S. Army was the first branch to experiment with non-cognitive screening tools to predict attrition and revocation. For the past decade, the Army Research Institute for the Behavioral and Social Sciences (ARI) has studied the emerging need to incorporate non-cognitive attributes in screening and fully optimize the pool of potential enlistees.

In 2000, ARI implemented the Assessment of Individual Motivation (AIM) test to expand the market of enlistment screening tools under the "GED Plus" program. Under this program, non-high school diploma graduates who were typically ineligible for service were able to enlist if they could score high enough on the AIM. Prior to the AIM test, non-cognitive tests were not effective due to the susceptibility for

prospective enlistees to fake answers on the exam. However, with the development of the AIM test, the Army was able to predict first-term attrition for some educational credentials.

In 2005, a selection screen called the Tier Two Attrition Screen (TTAS) was developed by the U.S. Army. DOD placed a 10-percent cap on enlistees who entered the military with Tier II status. Therefore, ARI developed a screen that combined the ASVAB, body mass index (BMI), and AIM to better evaluate the "whole person." The TTAS successfully predicted first-term attrition because the soldiers who passed the TTAS attrited at a rate that was 10 percentage points less than those who failed the screen. Since 2005, an additional 25,000 qualified soldiers have been able to enlist in the military due to development of TTAS.

In 2010, Wegner completed a comprehensive study on the AIM program and concluded that AIM is a useful tool for selecting GED credential holders who are most likely to complete their first-term of service. AIM is also useful in predicting early-term attrition for high school diploma graduates in the early months of service.

Another non-cognitive test used by the military is the Tailored Adaptive Personality Assessment System (TAPAS). This test is different from the AIM because there are no correct or incorrect answers, and the test is highly resistant to "fake" responses. Each individual exam varies depending upon an enlistee's response. This test is currently being used at the Military Entrance Processing Stations (MEPS), along with the ASVAB, to identify prospective enlistees with a low risk of first-term attrition.

The U.S. Marine Corps has been involved with non-cognitive screening and using it as a predictor of attrition. The Marine Corps and Navy Personnel Research, Studies, and Technology (NPRST) group are utilizing Navy Computer Adaptive Personality Scales (NCAPS) to measure job performance in air traffic controller and intelligence-oriented MOSs. Table 5 shows the personality traits the NCAPS evaluates by factor. A 2012 master's thesis by Trey McBride examined how non-cognitive screening can be used to predict first-term attrition within the Marine Corps Air Traffic Controller MOS. McBride recommended that non-cognitive screening be utilized prior to

prospective air traffic controllers receiving a guaranteed air traffic controller MOS. Further, NCAPS can be used by recruiters to fill manpower vacancies by prospective enlistees who qualify.

Table 5.   Navy Computer Adaptaive Personaility Scales (NCAPS) Traits for High Scores and Low Scores by Factor

Factor	High Scorer	Low Scorer
Achievement	Sets challenging goals; strives for excellence	Avoids challenging projects; gives up easily
Adaptability/Flexibility	Willing to change approach; likes variety at work	Difficulties adjusting to new situations and people
Attention to Detail	Exacting, precise, accurate; spots minor errors, dislikes clutter	Sloppy, imprecise; misses important details; makes carless errors; state of disarray
Dependability	Reliable, well organized, orderly, plans well	Unreliable, undependable, falls behind in duties, misses deadlines
Dutifulness/Integrity	Strong moral sense of duty and integrity	Rebellious, contemptuous; not accountable for own actions
Leadership Orientation	Willing to lead, take charge, offer opinions and direction, and to mobilize others; is confident, forceful, firm, and decisive	Prefers to let others assume leadership roles; is indecisive; does not enjoy being the center of attention; is submissive and readily falls into the role of "follower"
Perceptiveness/Depth of Thought	Interested in pursuing topics in depth and enjoys abstract thought; has a need to understand how things work; seeks to understand the "big picture"	Takes little time for reflection; is not comfortable engaging in abstract thought; has little desire to think things through in depth or to probe for new insights; takes a shortsighted, shallow view of things
Self-control/Impulsivity	Tends to act on the "spur of the moment;" speaks and vents emotions and engages in behaviors without thinking through possible consequences	Suppresses negative emotions and inappropriate behaviors, even in situations where it is difficult to do so; thinks before acting
Social Orientation	Outgoing, warm, likeable, sociable; values connections with others	Shy, reserved, aloof, prefers to be alone; creates friction when around others
Self Reliance	Self-sufficient, resourceful, likes to make own decisions	Relies on others to get things done; depends on others
Stress Tolerance	Maintains composure and thinks clearly under stress; can easily put aside worries	Becomes indecisive or makes poor decision under stress; prone to worry
Vigilance	Alert to environment	Experiences lapses in attention
Willingness to Learn	Learns from mistakes; seeks learning opportunities; takes advice	Avoids training opportunities; does not seek clarification; narrow range of interests

Source: Amanda O. Lords, Ronald M. Bearden, Hubert Chen, & Geoffrey Fedak, *Navy Computer Adaptive Personality Scales: Initial Results* (Millington, TN: NPRST, 2006), 2.

E.   SUMMARY

Studies on attrition and education credentials generally arrive at the same conclusion. As can be seen in the literature review, education credentials are one of the most important factors in predicting premature separation from the military. The dichotomy of high school credential holders and non-high school diploma credential holders is still prevalent in today's screening process. The process becomes considerably more complicated and less precise when one considers alternative credentials designed to "substitute" for a traditional high school diploma. For example, accessions with an adult high school education or those with one semester of college tend to have relatively high rates of attrition over the past 20 years.

The educational tier system was developed to standardize a process of categorizing alternative credentials across the military services. Over the years, research has shown that the system is far from perfect in practice. Additionally, many external factors can affect attrition and military participation rates by youth from different demographic backgrounds; these include certain enlistment standards, political and economic conditions, and generational influencers of today's youth. These factors are generally less predictable or controllable. At the same time, non-cognitive testing has shown great promise in helping to reduce first-term attrition and to improve the effectiveness of identifying highly-qualified recruits. Thus, the U. S. Marine Corps has taken a keen interest in non-cognitive testing to identify the traits, skills, and motivations of applicants who possess a relatively high likelihood for succeeding as Marines.

III. DATA AND METHODOLOGY

A. DATA

The dataset used for this study was obtained from the Marine Corps Total Force Data Warehouse (TFDW). The raw data file of enlistees contained 186,936 observations for those who enlisted in the Marine Corps between fiscal years 2003–2007. These years were selected to provide the most recent Marine Corps cohorts for this analysis, considering the time required to study attrition behavior after entry into active duty.

Enlisted accession dates and end of active service (EAS) dates were used to identify first-term attrites. Time spent in the Marine Corps was recorded in calendar days. Any Marine who exited service under a 4-year obligation is considered to have attrited for purposes of this study. However, Marines who exited service before their EAS who qualified for the volunteer enlisted early release program (VEERP) were not classified as attrites. Mortally wounded Marines were also not considered to be attrites. Observations with missing or unreliable data were removed from the dataset. Enlistees who had a percentile score of 30 or below on the AFQT were removed from the sample, as potentially erroneous. Variables obtained at the time of enlistment, including ethnicity, gender, age, AFQT scores, and marital status were recorded and used in the statistical analysis. The final sample included 163,744 observations. Table 6 describes the variables used in the dataset.

Table 6.   Data Descriptions

Variable	Description
ATTRITE	= 1 If attrite from USMC, = 0 if otherwise
AFQT	= AFQT score, continuous variable from 31-99
AFQT_1	= 1 if enlistee AFQT was over 92, = 0 otherwise
AFQT 2	= 1 if enlistee's AFQT was between 65-92, = 0 otherwise
AFQT 3A	= 1 if enlistee's AFQT was between 50-64, = 0 otherwise
AFQT 3B	= 1 if enlistee's AFQT was between 31-49, = 0 otherwise
MALE	= 1 if enlistee was male, = 0 otherwise
FEMALE	= 1 if enlistee was female, = 0 otherwise
MARRIED	= 1 if enlistee was married, = 0 otherwise
SINGLE	= 1 if enlistee was single, = 0 otherwise
DEPENDENTS	Number of dependents
AGE	Age of enlistee at the time of enlistment
BLACK	= 1 if enlistee was Black or African American, = 0 otherwise
APINA	= 1 if enlistee was Native Hawaiian or Pacific Islander, = 0 otherwise
OTHER RACE	= 1 if enlistee was Hispanic, Alaska Native or Did not respond
WHITE	= 1 if enlistee was White, = 0 otherwise
ASIAN	= 1 if enlistee was Asian, =0 otherwise
NATIVE	= 1 if enlistee was American Indian, =0 otherwise
EDUC CODE	Enlistee's education code at time of enlistment
OLD TIER I	= 1 if enlistee's education code was in Tier I, under old classification, =0 if otherwise
OLD TIER II	= 1 if enlistee's education code was in Tier II, under old classification, =0 if otherwise
OLD TIER III	= 1 if enlistee's education code was in Tier III, under old classification, =0 if otherwise
UPDATED TIER I	= 1 if enlistee's education code was in Tier I, under new classification, =0 if otherwise
UPDATED TIER II	= 1 if enlistee's education code was in Tier II, under new classification, =0 if otherwise
UPDATED TIER III	= 1 if enlistee's education code was in Tier III, under new classification, =0 if otherwise
FY	Fiscal Year of enlistment
FY_03	= 1 if entered the USMC in fiscal year 2003, =0 if otherwise
FY_04	= 1 if entered the USMC in fiscal year 2004, =0 if otherwise

Variable	Description
FY_05	= 1 if entered the USMC in fiscal year 2005, =0 if otherwise
FY_06	= 1 if entered the USMC in fiscal year 2006, =0 if otherwise
FY_07	= 1 if entered the USMC in fiscal year 2007, =0 if otherwise
SEPARATION CODE	Reason why enlistee was separated from the Marine Corps
EAS	End of active service

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

B.   DESCRIPTIVE STATS FOR THE 2003–2007 SAMPLE

Since the inception of the AVF, the Marine Corps has had a somewhat different composition than the other services based on certain demographic measures. For example, the Marine Corps tends to have the lowest proportions of Asian and Black accessions of all the service branches.[54] In 2010, the proportion of married accessions in the Marine Corps stood at 2.6 percent. For that same year, the proportions of married accessions in the other branches were 4.5 percent in the Navy, 11.2 percent in the Air Force, and 17.7 percent in the Army.[55] That same year, the Marine Corps had the highest proportion of White enlisted accessions (85.1 percent) of any other service.[56] These variations in background characteristics may affect the attrition and reenlistment decisions of a Marine differently from those of members in other services.

Figure 6 shows the attrition rates by year for the dataset obtained from TFDW. From 2003 to 2006, attrition rates rose continuously. Previous studies have shown the same pattern of first-term attrition when male and female attrition rates were combined.

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[54] Nolan and Bicksler, *Minorities in the Enlisted Force: Is the U.S. Military Representative of the Nation It Defends?*, 21.

[55] *Population Representation in the Military Service, Fiscal Year 2010*, Department of Defense, 2006, http://prhome.defense.gov/RFM/MPP/ACCESSION%20POLICY/PopRep2010/summary/summary.html, 2–14.

[56] Ibid., B–10.
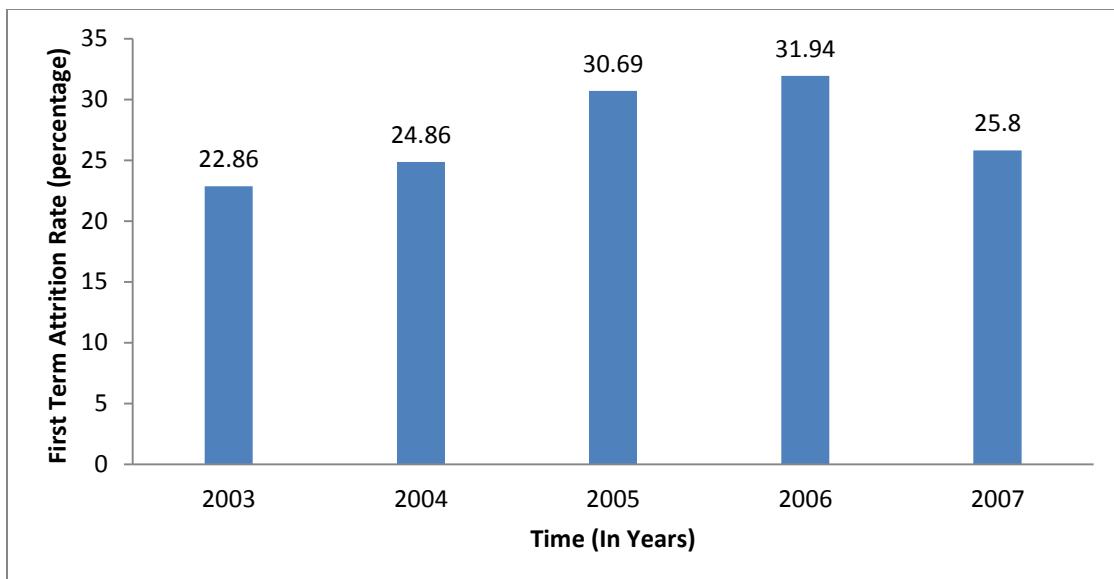
Figure 6.   Marine Corps Attrition Rates from 2003–2007

The highest attrition rate over this five-year period was recorded in FY 2006 at nearly 32 percent. As a result, the largest numbers of accessions were brought in the following year (2007), to recover from these personnel losses.

Table 7 shows descriptive statistics for the variables of interest. The typical enlistee in this dataset is a white male who is 19 years old and single with no dependents. The largest attrition rate over this five-year period was observed in FY 2006. The Marine Corps traditionally has had one of the youngest pools of enlistees. Over the relevant time period for this study, that trend continued to hold true. This dataset shows that 53 percent of total accessions in the Marine Corps were under the age of 18 years. Interestingly, 38 percent of Marine accessions had AFQT percentile scores between 65 and 92. Also, the attrition rates across all the AFQT categories were between 27.19 and 30.43 percent, which suggests that the AFQT is a better measure of trainability than a predictor of attrition. With regards to race, Marines in this sample were 75.86 percent *white*, 6.55 percent *Black*, 1.71 percent *Asian*, .46 percent *Asian Pacific Islander* and 14.86 percent fell under the *other race* category in the sample. In addition, the attrition

rate among the *other race* category was 8.94 percent. The actual ethnic groups included in the *other race* category cannot be specified.

Table 7.   Descriptive Statistics for USMC Enlistees, Fiscal Years 2003–2007

CATEGORY	VARIABLES	Percent of Sample (%)	Attrition Rate (%)
Enlistment Year	FY 2003	11.09	22.86
	FY 2004	20.52	24.35
	FY 2005	21.66	30.69
	FY 2006	22.76	31.94
	FY 2007	23.97	25.8
Gender	Male	93.23	32.33
	Female	6.77	27.29
Age	Age 17 and 18	53.66	25.71
	Age 19 and up	46.34	29.86
	Mean	19.09	
AFQT Score	AFQT_1	5.74	30.43
	AFQT_2	38.35	27.57
	AFQT_3A	25.89	27.19
	AFQT_3B	29.84	27.59
Race	White	75.86	31.27
	Black	6.55	27.67
	Asian Pacific Islander	0.46	25.5
	Asian	1.71	30.82
	Other Race	14.86	8.94
Dependent	No Dependents	98.64	27.65
	With Dependents	1.36	26.62
Marital Status	Single	96.07	27.65
	Married	3.93	27.22

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

C.   DESCRIPTIVE STATISTICS BY YEAR

This section of the thesis analyzes the personal characteristics of attrites by fiscal year. Table 8 presents a cross tabulation of the Marine Corps enlistees by marital status and gender. This table is separated by year of entry. The proportion of male accessions, who are married continues to remain at approximately 3–4 percent. However, a slight increase in married accessions occurred in 2003 with a high of 5.38 percent. Additionally, the proportion of female accessions who are married has increased slightly. From 2004 to 2007, a 1 percent increase in married occurred in married female Marines. Over the entire dataset, the data show an increasing number of married recruits entering the Marine Corps.

Table 8.   Cross Tabulation of USMC Enlistees by Marital Status, Fiscal Year, and Gender

FY	2003	2004	2005	2006	2007	Total
MALE						
MARRIED	892	1,085	1,180	1,146	1,435	5,738
%	5.24%	3.45%	3.57%	3.31%	3.94%	3.76%
SINGLE	16,122	30,402	31,900	33,487	35,012	146,923
%	94.76%	96.55%	96.43%	96.69%	96.06%	96.24%
Total	17,014	31,487	33,080	34,633	36,447	152,661
FEMALE						
MARRIED	84	126	138	154	188	690
%	7.35%	5.95%	5.80%	5.85%	6.69%	6.22%
SINGLE	1,059	1,993	2,242	2,478	2,623	10,395
%	92.65%	94.05%	94.20%	94.15%	93.31%	93.78%
Total	1,143	2,119	2,380	2,632	2,811	11,085
ALL						
MARRIED	976	1,211	1,318	1,300	1,623	6,428
%	5.38%	3.60%	3.72%	3.49%	4.13%	3.93%
SINGLE	17,181	32,395	34,142	35,965	37,635	157,318
%	94.62%	96.40%	96.28%	96.51%	95.87%	96.07%
Total	18,157	33,606	35,460	37,265	39,258	163,746

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

Table 9 shows a cross tabulation of enlistees by race, fiscal year, and gender. Looking at the entire dataset of enlistees by race from 2003–2007, about 76 percent of Marine Corps accessions were White and 6.5 percent were Black, which accounts for over 82 percent of the sample. In 2006, both male and female American Indian accessions decreased. However, some of these findings may be a result in the changing recruiting mission by the Marine Corps Recruiting Command.

Table 9.   Cross Tabulation of USMC Enlistees by Ethnicity, Fiscal Year, and Gender

FY	2003	2004	2005	2006	2007	Total
MALE						
ASIAN	259	515	517	625	664	2,580
%	1.52%	1.64%	1.56%	1.80%	1.82%	1.69%
AMERICAN INDIAN	81	142	179	170	224	796
%	0.48%	0.45%	0.54%	0.49%	0.61%	0.52%
BLACK	1,006	1,870	1,878	2,083	2,621	9,458
%	5.91%	5.94%	5.68%	6.01%	7.19%	6.20%
DECLINED TO RESPOND	3,851	7,055	6,545	4,874	409	22,734
%	22.6%	22.4%	19.8%	14.1%	1.1%	14.9%
NATIVE HAWAIIAN	6	87	156	171	279	699
%	0.04%	0.28%	0.47%	0.49%	0.77%	0.46%
WHITE	11,811	21,818	23,805	26,710	32,250	116,394
%	69.42%	69.29%	71.96%	77.12%	88.48%	76.24%
Total	17,014	31,487	33,080	34,633	36,447	152,661
FEMALE						
ASIAN	24	43	46	63	51	227
%	2.10%	2.03%	1.93%	2.39%	1.81%	2.05%
AMERICAN INDIAN	11	16	26	32	33	118
%	0.96%	0.76%	1.09%	1.22%	1.17%	1.06%
BLACK	95	225	247	312	394	1,273
%	8.31%	10.62%	10.38%	11.85%	14.02%	11.48%

FY	2003	2004	2005	2006	2007	Total
DECLINED TO RESPOND	261	458	461	386	27	1,593
%	22.8%	21.6%	19.4%	14.7%	1.0%	14.4%
NATIVE HAWAIIAN	0	10	13	12	23	58
%	0.00%	0.47%	0.55%	0.46%	0.82%	0.52%
WHITE	752	1,367	1,587	1,827	2,283	7,816
%	65.79%	64.51%	66.68%	69.41%	81.22%	70.51%
Total	1,143	2,119	2,380	2,632	2,811	11,085
ALL						
ASIAN	283	558	563	688	715	2,807
%	1.56%	1.66%	1.59%	1.85%	1.82%	1.71%
AMERICAN INDIAN	92	158	205	202	257	914
%	0.51%	0.47%	0.58%	0.54%	0.65%	0.56%
BLACK	1,101	2,095	2,125	2,395	3,015	10,731
%	6.06%	6.23%	5.99%	6.43%	7.68%	6.55%
DECLINED TO RESPOND	4,112	7,513	7,006	5,260	436	24,327
%	22.6%	22.4%	19.8%	14.1%	1.1%	14.9%
NATIVE HAWAIIAN	6	97	169	183	302	757
%	0.03%	0.29%	0.48%	0.49%	0.77%	0.46%
WHITE	12,563	23,185	25,392	28,537	34,533	124,210
%	69.19%	68.99%	71.61%	76.58%	87.96%	75.86%
Total	18,157	33,606	35,460	37,265	39,258	163,746

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

Table 10 shows the dependent status of enlistees by gender. As discussed in Chapter II of this study, the proportion of male enlisted accessions who enter the Marine Corps with dependents has never been more than 1.5 percent and female enlisted accessions with dependents has never been more than 1.2 percent between years 2003 to 2007. Overall, the total number of accessions without dependents accounts for over 98.6 percent of the dataset.

Table 10.　　Cross Tabulation of USMC Enlistees by Dependent Status, Fiscal Year, and Gender

FY	2003	2004	2005	2006	2007	Total
MALE						
WITH DEPENDENTS	192	375	488	520	529	2,104
%	1.13%	1.19%	1.48%	1.50%	1.45%	1.38%
NO DEPENDENTS	16,822	31,112	32,592	34,113	35,918	150,557
%	98.87%	98.81%	98.52%	98.50%	98.55%	98.62%
Total	17,014	31,487	33,080	34,633	36,447	152,661
FEMALE						
WITH DEPENDENTS	8	19	25	30	34	116
%	0.70%	0.90%	1.05%	1.14%	1.21%	1.05%
NO DEPENDENTS	1,135	2,100	2,355	2,602	2,777	10,969
%	99.30%	99.10%	98.95%	98.86%	98.79%	98.95%
Total	1,143	2,119	2,380	2,632	2,811	11,085
ALL						
WITH DEPENDENTS	200	394	513	550	563	2,220
%	1.10%	1.17%	1.45%	1.48%	1.43%	1.36%
NO DEPENDENTS	17,957	33,212	34,947	36,715	38,695	161,526
%	98.90%	98.83%	98.55%	98.52%	98.57%	98.64%
Total	18,157	33,606	35,460	37,265	39,258	163,746

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

The Marine Corps traditionally has a high percentage of younger enlistees when compared with the other services. As seen in Table 11, 53.7 percent of enlistees were between 17 and 18 years old. The peak year for younger enlisted accessions occurred in 2004. During 2004, males between the ages 17 and 18 accounted for 59.6 percent, while females in this younger age category accounted for 59.1 percent of all enlisted accessions.

Table 11.   Cross Tabulation of USMC Enlistees by Age, Fiscal Year, and Gender

FY	2003	2004	2005	2006	2007	Total
MALE						
Age 17 & 18	8,004	18,770	18,028	18,292	18,535	81,629
%	47.04%	59.61%	54.50%	52.82%	50.85%	53.47%
Age Over 18	9,010	12,717	15,052	16,341	17,912	71,032
%	52.96%	40.39%	45.50%	47.18%	49.15%	46.53%
Total	17,014	31,487	33,080	34,633	36,447	152,661
FEMALE						
Age 17 & 18	592	1,253	1,405	1,407	1,574	6,231
%	51.79%	59.13%	59.03%	53.46%	55.99%	56.21%
Age Over 18	551	866	975	1,225	1,237	4,854
%	48.21%	40.87%	40.97%	46.54%	44.01%	43.79%
Total	1,143	2,119	2,380	2,632	2,811	11,085
ALL						
Age 17 & 18	8,596	20,023	19,433	19,699	20,109	87,860
%	47.34%	59.58%	54.80%	52.86%	51.22%	53.66%
Age Over 18	9,561	13,583	16,027	17,566	19,149	75,886
%	52.66%	40.42%	45.20%	47.14%	48.78%	46.34%
Total	18,157	33,606	35,460	37,265	39,258	163,746

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

Table 12 shows a cross tabulation of enlistees by fiscal year and gender who have not completed their first contractual term of service, also known as first-term attrition. As discussed in Chapter II, the attrition rates of enlisted female accessions are higher than those of their male counterparts. When attrition rates are calculated across all five cohorts, the attrition rate of enlisted females is 5 percentage points higher than enlisted male attrition rates.

Table 12.   Cross Tabulation of USMC Enlistees by Attrition, Fiscal Year, and Gender

FY	2003	2004	2005	2006	2007	Total
MALE						
ATTRITE	3,819	7,576	10,047	10,965	9,255	41,662
%	22.45%	24.06%	30.37%	31.66%	25.39%	27.29%
FIRST-TERM COMPLETED	13,195	23,911	23,033	23,668	27,192	110,999
%	77.55%	75.94%	69.63%	68.34%	74.61%	72.71%
Total	17,014	31,487	33,080	34,633	36,447	152,661
FEMALE						
ATTRITE	331	608	836	937	872	3,584
%	28.96%	28.69%	35.13%	35.60%	31.02%	32.33%
FIRST-TERM COMPLETED	812	1,511	1,544	1,695	1,939	7,501
%	71.04%	71.31%	64.87%	64.40%	68.98%	67.67%
Total	1,143	2,119	2,380	2,632	2,811	11,085
ALL						
ATTRITE	4,150	8,184	10,883	11,902	10,127	45,246
%	22.86%	24.35%	30.69%	31.94%	25.80%	27.63%
FIRST-TERM COMPLETED	14,007	25,422	24,577	25,363	29,131	118,500
%	77.14%	75.65%	69.31%	68.06%	74.20%	72.37%
Total	18,157	33,606	35,460	37,265	39,258	163,746

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

Table 13 shows a cross tabulation of enlisted Marines who have attrited by marital status and gender. This table shows that married enlisted females are more likely to attrite than their enlisted male counterparts. Similarly, single enlisted females are more likely to attrite than single enlisted males. At the same time, single enlisted males are more likely to attrite than married males. The exact opposite is shown for enlisted females: married enlisted females are more likely than their single counterparts to complete their first term of enlistment.

Table 13.   Cross Tabulation of USMC Enlistees by Attrition, Marital Status, and
Gender

GENDER	FEMALE	MALE	Total
MARRIED			
ATTRITE	232	1,518	1,750
%	33.62%	26.46%	27.22%
FIRST-TERM COMPLETED	458	4,220	4,678
%	66.38%	73.54%	72.78%
Total	690	5,738	6,428
SINGLE			
ATTRITE	3,352	40,144	43,496
%	32.25%	27.32%	27.65%
FIRST-TERM COMPLETED	7,043	106,779	113,822
%	67.75%	72.68%	72.35%
Total	10,395	146,923	157,318
ALL			
ATTRITE	3,584	41,662	45,246
%	32.33%	27.29%	27.63%
FIRST-TERM COMPLETED	7,501	110,999	118,500
%	67.67%	72.71%	72.37%
Total	11,085	152,661	163,746

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

In Table 13, a cross tabulation shows the attrition rates of enlisted Marines by race and gender. As shown in numerous previous studies, the attrition rate of enlisted Black male accessions is higher than that of enlisted American Indian and Native Hawaiian male accessions.[57] Overall, American Indian male and female attrition rates are the lowest in the dataset.

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[57] Aline O. Quester, Marine Corps Recruits: A Historical Look at Accessions and Bootcamp Performance (Alexandria, VA: Center for Naval Analyses, 2010), 34.

Table 14.   Cross Tabulation of USMC Enlistees by Attrition, Race, and Gender

FY	ASIAN	AMERICAN INDIAN	BLACK	DECLINED TO RESPOND	NATIVE HAWAIIAN	WHITE	Total
MALE							
ATTRITE	790	176	2,592	2,032	179	35,893	41,662
%	30.62%	22.11%	27.41%	8.94%	25.61%	30.84%	27.29%
FIRST-TERM COMPLETED	1,790	620	6,866	20,702	520	80,501	110,999
%	69.38%	77.89%	72.59%	91.06%	74.39%	69.16%	72.71%
Total	2,580	796	9,458	22,734	699	116,394	152,661
FEMALE							
ATTRITE	75	30	377	142	14	2,946	3,584
%	33.04%	25.42%	29.62%	8.91%	24.14%	37.69%	32.33%
FIRST-TERM COMPLETED	152	88	896	1,451	44	4,870	7,501
%	66.96%	74.58%	70.38%	91.09%	75.86%	62.31%	67.67%
Total	227	118	1,273	1,593	58	7,816	11,085
ALL							
ATTRITE	865	206	2,969	2,174	193	38,839	45,246
%	30.82%	22.54%	27.67%	8.94%	25.50%	31.27%	27.63%
FIRST-TERM COMPLETED	1,942	708	7,762	22,153	564	85,371	118,500
%	69.18%	77.46%	72.33%	91.06%	74.50%	68.73%	72.37%
Total	2,807	914	10,731	24,327	757	124,210	163,746

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

Tables 14 and 15 show the Marine Corps attrition rate by educational tier for fiscal years 2003–2007. These data demonstrate that the attrition rates for all persons in all tier categories steadily increased from FY 2004 until FY 2007. A comparison of attrition rates in these tables also show that the attrition rates in Tier I basically remained the same after shifting 1,222 enlistees from Tier II to Tier 1. Yet, the effect on Tier II was a slight increase in the attrition rate for all annual cohorts.

Table 15.   USMC First Term Attrition by Old Educational Tier

Variable	N	FY2003	FY2004	FY2005	FY2006	FY2007
Old Tier I	157,765	22.9%	24.2%	30.5%	31.7%	25.6%
Old Tier II	5,796	31.6%	36.2%	40.4%	41.7%	29.9%
Old Tier III	185	22.7%	30.8%	52.0%	37.2%	27.3%

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

Table 16.   USMC First Term Attrition by New Educational Tier

Variable	N	FY2003	FY2004	FY2005	FY2006	FY2007
Updated Tier I	158,987	22.9%	24.3%	30.5%	31.7%	25.6%
Updated Tier II	4,574	33.5%	37.5%	42.7%	43.3%	31.6%
Updated Tier III	185	22.7%	30.8%	52.0%	37.2%	27.3%

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

D.   SUMMARY

The proportions of married Marines in the entry cohorts for the present study have remained about the same over time, although the actual numbers have increased. Additionally, the composition of enlisted accessions by race reveals that over 82 percent of the dataset is composed of Black and White enlisted accessions. Another interesting result is seen in the ages of enlisted accessions: more than half of those in the dataset were between the ages of seventeen and eighteen when they entered active duty. Furthermore, the attrition rates of enlisted female accessions are much higher than those of enlisted male accessions. As revealed by previous studies, the attrition rate of American Indian accessions is much lower than that of any other racial/ethnic group represented in the dataset. When further analyzing the attrition rates, single females are slightly less likely to attrite than married females. Conversely, married men are slightly less likely to attrite than single men.

E. METHODOLOGY

In this analysis, an enlistee who enters the Marine Corps can only exit the system by two means, successfully completing a first term of service or by attrition. For the rest of the analysis in this study, attrite is a binary dependent variable defined as follows:

$Y_i = 0$, if enlistee i completes his/her first term of enlistment
$Y_i = 1$, if enlistee i attrites from the Marine Corps before completing the first term

The effect of the explanatory variables on the probability to attrite will be estimated via probit.

1. Variables

The variables of primary concern are education credentials, AFQT score, and educational tier classification. These variables determine enlistment eligibility by the Marine Corps Recruiting Command (MCRC). Twenty education credentials are shown in the original dataset. However, only 19 categories have sufficient sample sizes for statistical analysis. No enlistees from fiscal years 2003–2007 possess a nursing degree educational credential. The data include 12 Tier I variables: 15 college credits or job corps + GED, probationary HS senior, adult/alternate HS diploma graduate, associate's degree, high school diploma but failed exit exam, bachelor's degree, high school diploma graduate, enrolled in other than HS program, master's degree, traditional high school senior, post-baccalaureate degree. Tier II consists of seven: non-traditional high school credential, correspondence school diploma, occupational program, GED, home school, attendance based high school diploma, and National Guard Youth Challenge. Tier III only consists of one variable, non-high school graduate. Other variables that are highly correlated with first-term attrition were included in the models. These variables include age, gender, marital status, dependency status, ethnicity, AFQT score, and cohort year. Table 17 presents descriptions of each education variable and the associated tier classification.

Table 17.   Education Credentials

Variable	Code	Tier	Variable Name	Variable Description
Non-High School (HS) Grad	1	III	ed_1	Not currently attending HS or alternative education and hold neither a Tier I or Tier II credential
Other non-traditional	5	II	ed_5	Credential issued for completing alternative school that differs in curriculum from traditional HS program
Correspondence school diploma	7	II	ed_7	Diploma or certificate awarded upon completion of correspondence school, distance learning, or independent study
15 college credits or Job Corps + GED	8	I	ed_8	Completion of 15 semester credits, 22 quarter credits, or 675 clock hours of instruction from an accredited post-secondary institution. Alternately, earning a GED while completing Job Corps program
Probationary HS senior	9*	I	ed_9	HS seniors enrolled in Tier I program who have not completed at least 70 percent of credits required to graduate
Adult/alternate HS diploma grad	B	I	ed_B	Diploma awarded on the basis of completing an alternative, continuation, adult, or charter program whose curriculum satisfies grad requirements of traditional HS
Occupational program certificate/diploma	C	II	ed_C	Certificate/diploma for non-correspondence vocational, technical, or proprietary secondary school program, plus completion of at least 11 years of traditional school
Associate's degree	D	I	ed_D	Postsecondary degree–Associate's
GED	E	II	ed_E	Test-based equivalency diploma, GED certificate
HS diploma but failed exit exam	F	I	ed_F	Completed all necessary credits for graduation but did not pass state mandated exit exam(s)

Variable	Code	Tier	Variable Name	Variable Description
Home schooled	H	II	ed_H	Home school diploma from parent or home school association
Attendance based HS diploma	J	II	ed_J	HS certificate of attendance or completion–based on course completion rather than on a test, such as GED
Bachelor's degree	K	I	ed_K	Postsecondary degree–Bachelor's
HS diploma grad	L	I	ed_L	Traditional HS diploma graduate
Enrolled in other than HS program	M*	I	ed_M	Attending class in a Tier I category other than traditional HS (college, Job Corps, etc.)
Master's degree	N	I	ed_N	Postsecondary degree–Master's
Traditional HS senior	S*	I	ed_S	HS students who have completed junior year and earned at least 70 percent or required grad credits
Post-baccalaureate	U	I	ed_U	Education beyond Bachelor's degree
Post-baccalaureate	W	I	ed_W	Education beyond Bachelor's degree
Nat'l Guard Youth Challenge	X	II	ed_X	National Guard Youth Challenge Program/Seaborne Challenge Corps cert of completion + GED

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

For the statistical analysis, the following models will be estimated via probit:

$$\text{Attrite} = \beta_0 + \beta_1(\text{afqt\_1}) + \beta_3(\text{female}) + \beta_4(\text{sngwdep}) + \beta_4(\text{marriednokids}) + \beta_5(\text{marriedwkids}) + \beta_6(\text{age}) + \beta_7(\text{Black}) + \beta_8(\text{asian}) + \beta_9(\text{apina}) + \beta_{10}(\text{otherrace}) + \beta_{11}(\text{oldtier2}) + \beta_{12}(\text{oldier3}) + \beta_{13}(\text{FY\_04}) + \beta_{14}(\text{FY\_05}) + \beta_{15}(\text{FY\_06}) + \beta_{16}(\text{FY\_07}) + \mu$$
$$(1)$$

This model will estimate the attrition probability as predicted by the old education tiers, and all other observables. To see whether the new tier classification makes a difference, the second model is specified as follows:

$$\text{Attrite} = \beta_0 + \beta_1(\text{afqt\_1}) + \beta_3(\text{female}) + \beta_4(\text{sngwdep}) + \beta_4(\text{marriednokids}) + \beta_5(\text{marriedwkids}) + \beta_6(\text{age}) + \beta_7(\text{Black}) + \beta_8(\text{asian}) + \beta_9(\text{apina}) + \beta_{10}(\text{otherrace}) + \beta_{11}(\text{newtier2}) + \beta_{12}(\text{newtier3}) + \beta_{13}(\text{FY\_04}) + \beta_{14}(\text{FY\_05}) + \beta_{15}(\text{FY\_06}) + \beta_{16}(\text{FY\_07}) + \mu$$
$$(2)$$

More insights can be gained into the effectiveness of categorizing individuals into tiers if we look into all separate educational categories:

$$\text{Attrite} = \beta_0 + \beta_1(\text{afqt\_1}) + \beta_3(\text{female}) + \beta_4(\text{sngwdep}) + \beta_4(\text{marriednokids}) + \beta_5(\text{marriedwkids}) + \beta_6(\text{age}) + \beta_7(\text{Black}) + \beta_8(\text{asian}) + \beta_9(\text{apina}) + \beta_{10}(\text{otherrace}) + \beta_{11}(\text{Education Category})_j + \beta_{13}(\text{FY\_04}) + \beta_{14}(\text{FY\_05}) + \beta_{15}(\text{FY\_06}) + \beta_{16}(\text{FY\_07}) + \mu \ (3)$$

All these models will be estimated for the entire sample of recruits, and also for the subset of recruits who survive boot camp. The reason for this is to determine if similar variables are found to be correlated between first term attrition and fleet attrition.

IV. ANALYSIS OF MARINE CORPS FIRST-TERM ATTRITION

The ability of an enlistee to complete his or her initial service contract is one of three important measures of success (the other two being promotion and reenlistment).[58] This particular measure is even more important during the era of the All-Volunteer Force. Once an enlistee has completed the first term, the Marine Corps has essentially recovered an important return on investment from that individual. For the Marine Corps to recoup the money that has been invested into each recruit through boot camp, MOS school, equipment, time, salaries, administration, and other expenses, each recruit must complete approximately four years of service.

In many instances, the military loses its initial investment due to enlistees not completing their first term of enlistment, which is known as first-term attrition. Attrition can be attributed to various factors, such as conduct violations, poor performance, and an inability to adapt to the military way of life. When attrition occurs, it is a drain on the Department of Defense (DoD) budget. DoD is also forced to adjust its recruiting tactics to replace the Marines who attrite. To mitigate high levels of attrition, manpower analysts study the characteristics of recruits and how they might relate to various trends from one year to the next. More importantly, it is essential to understand that attrition is not necessarily a negative consequence if it occurs during the DEP or boot camp. During these preliminary screening stages, the military has made a relatively smaller financial investment in the recruit. One could also argue that it is better to remove a person who might not be suited for the military lifestyle as early as possible. In financial terms as well, it is easy to see that attrition is more detrimental when it occurs after the Marine has reached a first duty station. Therefore, it is important to observe and analyze the characteristics, demographics, and education credentials of enlistees to determine if fleet attrition can be predicted.

This chapter evaluates first-term attrition over the course of the entire first term of enlistment by education tier credential. This chapter also examines the characteristics of

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[58] Quester, North, and Kimble, *Identifying Successful Marine Corps Recruits*, 5.

the Marine Corps educational tier system based on education codes in each tier prior to June 1, 2012. After June 1, 2012, the Marine Corps decided to change the "home school" educational code to Tier I. Consequently, the analysis focuses on the educational tier system after June 1, 2012 to ascertain if that modification improved the overall predictability of the tier system. Subsequently, an analysis is conducted on educational credentials that have neglected to be classified within the tier system.

A. RESULTS

This section provides the results of first-term attrition by educational credentials of the tier classification system before and after June 1, 2012, and also by individual education codes.

1. Attrition by Educational Tier

This section analyzes the attrition rates of each of the three educational tiers based on education credentials prior to June 1, 2012.

Using Maximum Likelihood Estimation (MLE), an attrition model was estimated via probit to test the statistical significance of the educational tiers. Similar to the analysis by Andrew (2009), variables identified in Table 7 are acknowledged as having significant effects on first-term attrition.[59] The model was based on an average recruit that enlisted in the Marine Corps in FY 2003. An "average-aged recruit" is a 19-year-old white male, with a Tier I education credential, no dependents, and an AFQT percentile score of 61. First, the study estimates Model (1), replicated below:

$$\text{Attrite} = \beta_0 + \beta_1(\text{afqt\_1}) + \beta_3(\text{female}) + \beta_4(\text{sngwdep}) + \beta_4(\text{marriednokids}) + \beta_5(\text{marriedwkids}) + \beta_6(\text{age}) + \beta_7(\text{Black}) + \beta_8(\text{asian}) + \beta_9(\text{apina}) + \beta_{10}(\text{otherrace}) + \beta_{11}(\text{oldtier2}) + \beta_{12}(\text{oldier3}) + \beta_{13}(\text{FY\_04}) + \beta_{14}(\text{FY\_05}) + \beta_{15}(\text{FY\_06}) + \beta_{16}(\text{FY\_07}) + \mu$$
$$(1)$$

All descriptive statistics of the specified model are shown in Table 18.

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[59] Andrew, "Improved Screening for Navy Enlistment," 31.

Table 18.   Model 1—Variable and Descriptive Statistics

Variable	Description	Mean	Std. Dev.
Attrite	= 1 If attrite from USMC, = 0 if otherwise	0.2763	0.4472
AFQT	= AFQT score, continuous variable from 31–99	61.7816	18.6060
Female	= 1 if enlistee was female, = 0 otherwise	0.0677	0.2512
Single with Dependents	= 1 if marital status is "single" and dependents >= 1, 0 otherwise	0.0046	0.0679
Married with no Kids	= 1 if marital status is "married" and dependents < 1, 0 otherwise	0.0320	0.1759
Married with Dependents	= 1 if marital status is "married" and dependents >= 1, 0 otherwise	0.0033	0.0570
Age	= Age of enlistee at the time of enlistment	19.0908	2.3257
Black	= 1 if enlistee was Black or African American, = 0 otherwise	0.0655	0.2475
Asian	= 1 if enlistee was Asian, =0 otherwise	0.0171	0.1298
Asian Pacific Islander	= 1 if enlistee was Native Hawaiian or Pacific Islander, = 0 otherwise	0.0046	0.0678
Other race	= 1 if enlistee was American Indian, Hispanic, Alaska Native or Did not respond	0.1486	0.3557
Old Tier II	= 1 if enlistee's education code was in Tier II, under old classification, =0 if otherwise	0.0354	0.1848
Old Tier III	= 1 if enlistee's education code was in Tier III, under old classification, =0 if otherwise	0.0011	0.0336
Fiscal Year 2004	= 1 if entered the USMC in fiscal year 2004, =0 if otherwise	0.1974	0.3980
Fiscal Year 2005	= 1 if entered the USMC in fiscal year 2005, =0 if otherwise	0.2120	0.4087
Fiscal Year 2006	= 1 if entered the USMC in fiscal year 2006, =0 if otherwise	0.2265	0.4185
Fiscal Year 2007	= 1 if entered the USMC in fiscal year 2007, =0 if otherwise	0.1619	0.3683

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

The estimates of Model (1) are shown in Table 19. They show that females have higher attrition probabilities than men (by about 6 percentage points). The findings also show that all ethnicities have a higher probability of completing their initial service contract when compared to whites.

All education tiers appear significant. As hypothesized, Tier II and Tier III individuals had higher attrition rates than did Tier I enlistees. More specifically, Tier II individuals have a probability of attriting that is 7 percentage points higher than Tier I recruits. Similarly, Tier III recruits have a probability of attriting that is 10 percentage points higher than Tier I recruits. The Tier system was developed precisely for this reason. Both of these variables are highly significant at the 1% significance level.

Table 19.   Regression Results Using Old Education Tiers

Variables	Probit Coefficients	Partial Effects
AFQT	-0.0003	-0.0001
	(0.000)	(0.000)
Female	0.1711***	0.0588***
	(0.012)	(0.004)
Single with Dependents	-0.1961***	-0.0605***
	(0.049)	(0.014)
Married with no Kids	0.1027***	0.0348***
	(0.017)	(0.006)
Married with Dependents	-0.1105**	-0.0351**
	(0.054)	(0.017)
Age	0.0645***	0.0212***
	(0.001)	(0.000)
Black	-0.0915***	-0.0294***
	(0.013)	(0.004)
Asian	0.0013	0.0004
	(0.024)	(0.008)
Asian Pacific Islander	-0.1926***	-0.0595***
	(0.046)	(0.013)
Native American	-0.2489***	-0.0753***
	(0.043)	(0.012)

Variables	Probit Coefficients	Partial Effects
Other race	-0.8412***	-0.2177***
	(0.012)	(0.002)
Old Tier II	0.2045***	0.0711***
	(0.017)	(0.006)
Old Tier III	0.2772***	0.0983***
	(0.090)	(0.034)
Fiscal Year 2004	0.1311***	0.0443***
	(0.011)	(0.004)
Fiscal Year 2005	0.2825***	0.0976***
	(0.011)	(0.004)
Fiscal Year 2006	0.2071***	0.0706***
	(0.010)	(0.004)
Fiscal Year 2007	-0.0377***	-0.0123***
	(0.010)	(0.003)
Constant	-1.8451***	
	(0.028)	
Observations	163,746	163,746
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

The second model is similar to the first model with the same demographic variables. The only difference between the two models is that the second model includes the home schooled recruits into Tier I:

$$\text{Attrite} = \beta_0 + \beta_1(\text{afqt\_1}) + \beta_3(\text{female}) + \beta_4(\text{sngwdep}) + \beta_4(\text{marriednokids}) + \beta_5(\text{marriedwkids}) + \beta_6(\text{age}) + \beta_7(\text{Black}) + \beta_8(\text{asian}) + \beta_9(\text{apina}) + \beta_{10}(\text{otherrace}) + \beta_{11}(\text{newtier2}) + \beta_{12}(\text{newtier3}) + \beta_{13}(\text{FY\_04}) + \beta_{14}(\text{FY\_05}) + \beta_{15}(\text{FY\_06}) + \beta_{16}(\text{FY\_07}) + \mu \ (2)$$

Table 20 shows the variables and descriptive statistics for model (2).

Table 20. Model 2–Variable and Descriptive Statistics

Variable	Description	Mean	Std. Dev.	Min	Max
Attrite	= 1 If attrite from USMC, = 0 if otherwise	0.2763	0.4472	0	1
AFQT	= AFQT score, continuous variable from 31–99	61.7816	18.6060	30	99
Female	= 1 if enlistee was female, = 0 otherwise	0.0677	0.2512	0	1
Single w/Depend	= 1 if marital status is "single" and dependents >= 1, 0 otherwise	0.0046	0.0679	0	1
Married w/no Kids	= 1 if marital status is "married" and dependents < 1, 0 otherwise	0.0320	0.1759	0	1
Married w/Depend	= 1 if marital status is "married" and dependents >= 1, 0 otherwise	0.0033	0.0570	0	1
Age	= Age of enlistee at the time of enlistment	19.0908	2.3257	16	34
Black	= 1 if enlistee was Black or African American, = 0 otherwise	0.0655	0.2475	0	1
Asian	= 1 if enlistee was Asian, =0 otherwise	0.0171	0.1298	0	1
Asian Pacific Islander	= 1 if enlistee was Native Hawaiian or Pacific Islander, = 0 otherwise	0.0046	0.0678	0	1
Other race	= 1 if enlistee was American Indian, Hispanic, Alaska Native or Did not respond	0.1486	0.3557	0	1
New Tier II	= 1 if enlistee's education code was in new tier II, under old classification, =0 if otherwise	0.0279	0.1648	0	1
New Tier III	= 1 if enlistee's education code was in new tier III, under old classification, =0 if otherwise	0.0011	0.0336	0	1
Fiscal Year 2004	= 1 if entered the USMC in fiscal year 2004, =0 if otherwise	0.1974	0.3980	0	1
Fiscal Year 2005	= 1 if entered the USMC in fiscal year 2005, =0 if otherwise	0.2120	0.4087	0	1
Fiscal Year 2006	= 1 if entered the USMC in fiscal year 2006, =0 if otherwise	0.2265	0.4185	0	1
Fiscal Year 2007	= 1 if entered the USMC in fiscal year 2007, =0 if otherwise	0.1619	0.3683	0	1

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

Table 21 presents the estimation results for model (2). When comparing the two regression results listed in Tables 19 and 21, it is evident that classifying home-schooled recruits as Tier I has increased the predictability and significance of Tier II enlistees. When the Tier classification system was modified, the goodness-of-fit did not improve. Table 21 shows that the second model yielded minor, but better effects to the current tier system.

Table 21.   Regression Results Using New Education Tiers

Variables	Probit	Partial Effects
AFQT	-0.0002	-0.0001
	(0.000)	(0.000)
Female	0.1713***	0.0589***
	(0.012)	(0.004)
Single with Dependents	-0.1966***	-0.0606***
	(0.049)	(0.014)
Married with no Kids	0.1035***	0.0351***
	(0.017)	(0.006)
Married with Dependents	-0.1090**	-0.0347**
	(0.054)	(0.017)
Age	0.0643***	0.0212***
	(0.001)	(0.000)
Black	-0.0921***	-0.0296***
	(0.013)	(0.004)
Asian	0.0005	0.0002
	(0.024)	(0.008)
Asian Pacific Islander	-0.1923***	-0.0594***
	(0.046)	(0.013)
Native American	-0.2494***	-0.0755***
	(0.043)	(0.012)
Other	-0.8410***	-0.2177***
	(0.012)	(0.002)
Updated Tier II	0.2455***	0.0862***
	(0.019)	(0.007)
Updated Tier III	0.2768***	0.0981***
	(0.090)	(0.034)
Fiscal Year 2004	0.1311***	0.0443***
	(0.011)	(0.004)
Fiscal Year 2005	0.2822***	0.0975***
	(0.011)	(0.004)
Fiscal Year 2006	0.2071***	0.0706***
	(0.010)	(0.004)
Fiscal Year 2007	-0.0363***	-0.0119***
	(0.010)	(0.003)
Constant	-1.8431***	

Variables	Probit	Partial Effects
	(0.028)	
Observations	163,746	163,746
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

2. Attrition by Education Credential

For the third regression model, instead of using the traditional tiers to group education codes, with each education credential is analyzed separately. Model (3) is replicated below:

$$\text{Attrite} = \beta_0 + \beta_1(\text{afqt\_1}) + \beta_3(\text{female}) + \beta_4(\text{sngwdep}) + \beta_4(\text{marriednokids}) +$$
$$\beta_5(\text{marriedwkids}) + \beta_6(\text{age}) + \beta_7(\text{Black}) + \beta_8(\text{asian}) + \beta_9(\text{apina}) + \beta_{10}(\text{otherrace}) +$$
$$\beta_{11}(\text{Education Category})_j + \beta_{13}(\text{FY\_04}) + \beta_{14}(\text{FY\_05}) + \beta_{15}(\text{FY\_06}) + \beta_{16}(\text{FY\_07})$$
$$+ \mu \ (3)$$

Table 22 shows the descriptive statistics for the new variables included in this model.

Table 22.   Model 3–Variable and Descriptive Statistics of Education Credentials

Variable	Description	Mean	Std. Dev.
Non-High School (HS) Grad	= 1 if educ credential "1", 0 otherwise	0.0011	0.0335
Other non-traditional	= 1 if educ credential "5", 0 otherwise	0.0017	0.0418
Correspondence school diploma	= 1 if educ credential "7", 0 otherwise	0.0012	0.0347
15 college creds or Job Corps + GED	= 1 if educ credential "8", 0 otherwise	0.0211	0.1439
Probationary HS senior	= 1 if educ credential "9", 0 otherwise	0.0000	0.0034
Adult/alternate HS diploma grad	= 1 if educ credential "B", 0 otherwise	0.0111	0.1051
Occupational program	= 1 if educ credential "C", 0 otherwise	0.0000	0.0081

Variable	Description	Mean	Std. Dev.
certificate/diploma			
Associate's degree	= 1 if educ credential "D", 0 otherwise	0.0045	0.0672
GED	= 1 if educ credential "E", 0 otherwise	0.0216	0.1456
HS diploma but failed exit exam	= 1 if educ credential "F", 0 otherwise	0.0007	0.0277
Home schooled	= 1 if educ credential "H", 0 otherwise	0.0074	0.0860
Attendance based HS diploma	= 1 if educ credential "J", 0 otherwise	0.0012	0.0356
Bachelor's degree	= 1 if educ credential "K", 0 otherwise	0.0062	0.0788
Master's Degree	= 1 if educ credential "M", 0 otherwise	0.0099	0.0993
Enrolled in other than HS program	= 1 if educ credential "N", 0 otherwise	0.0003	0.0179
HS diploma grad	= 1 if educ credential "S", 0 otherwise	0.3848	0.4865
Traditional HS senior	= 1 if educ credential "W", 0 otherwise	0.0001	0.0104
Post-baccalaureate	= 1 if educ credential "X", 0 otherwise	0.0019	0.0442

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

It is important to analyze the educational codes separately to see how education codes within each tier vary relative to predicted attrition rates. When the educational tiers are separated, the results show which education credentials are individually significant. Table 23 shows the results of Model (3) and indicates that by separating the educational codes, the model predicts attrition more accurately.

As found in previous attrition studies, individuals with college credits or Job Corps (Tier I) continue to display high attrition rates. The enlistee who earns 15 college credits with a GED or alternative degree tends to have a higher likelihood of attrition than do many Tier II enlistees.

As hypothesized, recruits who possess higher levels of education beyond high school show promising trends of attrition predictability. The educational code with the lowest attrition probability is an enlistee with a Master's degree (Tier I).

The rest of the demographics have the same estimated results shown by previous research on attrition. For example, females appear more likely to attrite (by 5 percentage points). Also Blacks, Asians, and Native Americans have lower levels of attrition when compared to white recruits.

Table 23.   Model 3–Regression Results Without Tiers

Variables	Probit	Partial Effects
AFQT	-0.0003**	-0.0001**
	(0.000)	(0.000)
Female	0.1612***	0.0552***
	(0.012)	(0.004)
Single with Dependents	-0.2008***	-0.0617***
	(0.049)	(0.014)
Married with no kids	0.1285***	0.0437***
	(0.017)	(0.006)
Married with Dependents	-0.0869	-0.0278*
	(0.054)	(0.017)
Age	0.0446***	0.0147***
	(0.002)	(0.001)
Black	-0.0934***	-0.0299***
	(0.013)	(0.004)
Asian	0.0033	0.0011
	(0.024)	(0.008)
Asian Pacific Islander	-0.1977***	-0.0608***
	(0.046)	(0.013)
Native American	-0.2506***	-0.0756***
	(0.043)	(0.012)
Other Race	-0.8379***	-0.2164***
	(0.012)	(0.002)
Less than HS	0.1947**	0.0676**
	(0.090)	(0.033)

Variables	Probit	Partial Effects
Non traditional HS	0.3173***	0.1133***
	(0.074)	(0.028)
Correspondence Diploma	0.1471	0.0504
	(0.090)	(0.032)
1 Semester of College	-0.0386*	0.0128*
	(0.022)	(0.007)
Probation HS Senior	1.1592*	0.4375**
	(0.611)	(0.211)
Adult Diploma	0.0307	0.0102
	(0.030)	(0.010)
Occupational Certificate	-0.4698	-0.1295
	(0.444)	(0.097)
Associate Degree	-0.1960***	-0.0603***
	(0.048)	(0.014)
GED	0.1603***	0.0551***
	(0.022)	(0.008)
Exam Fail	-0.1312	-0.0413
	(0.113)	(0.034)
Home Study	-0.0352	-0.0114
	(0.037)	(0.012)
Attendance Certificate	0.2309***	0.0809**
	(0.085)	(0.031)
Bachelors	-0.1714***	-0.0532***
	(0.041)	(0.012)
Near HS Comp	-0.1621***	-0.0505***
	(0.032)	(0.009)
Master's Degree	-0.4611**	-0.1276***
	(0.180)	(0.040)
HS Senior	-0.2109***	-0.0684***
	(0.008)	(0.003)
1st Professional Degree	0.2554	0.0900
	(0.291)	(0.108)
GED National Guard Youth Challenge	0.1815**	0.0628**
	(0.074)	(0.027)
Fiscal Year 2004	0.1329***	0.0448***
	(0.011)	(0.004)
Fiscal Year 2005	0.2812***	0.0969***

Variables	Probit	Partial Effects
	(0.011)	(0.004)
Fiscal Year 2006	0.2056***	0.0700***
	(0.010)	(0.004)
Fiscal Year 2007	-0.0396***	-0.0129***
	(0.010)	(0.003)
Constant	-1.3729***	
	(0.035)	
Observations	163,746	163,746
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

B.   SUMMARY OF RESULTS

In conclusion, it is probable that the home school education code was switched to Tier I status because a progression of performance was seen for enlistees who obtained the home school educational code. It may even be assumed that more oversight from the government occurred to standardize testing and teaching standards to help improve the legitimization of home schooled individuals. However, when home schooled individuals are pooled with the Tier I credential holders, a more accurate predictor of attrition is evident. The military may have based their decision to alter the tier system based on the civilian labor market since the performances of home-schooled individuals are comparable to HS graduates. The alteration may be a product of political pressures similar to those placed on DoD by the GED testing services in the 1990s as discussed in Chapter II. Indeed, when the education codes are separated and evaluated independently, home-schooled recruits have attrition rates that are similar to high school diploma graduates.

V. FLEET ATTRITION ANALYSIS

This chapter examines boot camp attrition and factors that lead to fleet attrition. As discussed in Chapter I, fleet attrition causes a financial burden on the Marine Corps due to the monetary investment of basic training, MOS training, and various other costs. With that in mind, it is imperative that analysis be completed on enlistees beyond the event of boot camp. More importantly, many of the Marines that attrite from Marine Corps boot camp are not for adaptability reasons. Many enlistees, specifically women, have historically not been able to avoid physical injuries due to the rigorous training and constant physical stress placed on them during the first 60 to 75 days of boot camp. When analysis is done on individuals that have completed boot camp, we are able to look at reasons outside of medical discharges, which are where majority of these types of discharges occur.

This chapter examines demographics and personal characteristics to determine if these traits can be used to predict future attrition. The objective of this section is to analyze the enlistees who survive boot camp to identify what causes the expensive premature separation from the Marine Corps.

A. DATA

The dataset used for this chapter is the same data from TFDW that has been used throughout the thesis. However, Marines who attrite in less than 120 days of service were removed from the sample. The author chose to remove Marines who attrite in less than 120 days because boot camp for the Marine Corps lasts approximately 90 days. After an enlisted Marine exits boot camp, Marines usually take a short period of leave and then transition to advanced training, known as Marine Combat Training (MCT), or the School of Infantry (SOI) for Marines in the infantry. This time period is on average under 120 days unless the individual is on medical hold for a serious injury from boot camp that requires medical surgery or extensive rehabilitation. Once a Marine has exited boot camp, that individual is then considered to be a Fleet Marine. After the appropriate

modifications were made, the dataset was reduced to 152,476 observations. Tables 24 and 25 show the attrition rates of Marines who completed boot camp by educational tier.

Table 24.   Fleet Attrition Rates by Old Educational Tiers

Variable	N	FY2004	FY2005	FY2006	FY2007	FY2007
Old Tier I	67,218	20.1%	20.9%	25.7%	24.9%	18.8%
Old Tier II	2157	25.6%	32.0%	32.1%	31.2%	20.9%
Old Tier III	63	22.7%	28.0%	42.9%	12.9%	13.5%

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

Table 25.   Fleet Attrition Rates by New Educational Tiers

Variable	N	FY2003	FY2004	FY2005	FY2006	FY2007
Updated Tier I	67,835	20.1%	20.9%	25.7%	25.0%	18.8%
Updated Tier II	1,833	27.0%	33.2%	33.9%	32.0%	21.2%
Updated Tier III	68	22.7%	28.0%	42.9%	12.9%	13.5%

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

B.   METHODOLOGY

Similar to the dataset utilized in Chapter III, enlisted cohorts from 2003–2007 were used to analyze fleet attrition. The same demographics, such as tier classification, gender, AFQT score dependency status, race, and marital status were used. These results were then compared with the results of the probit analysis found in Chapter IV to determine if their characteristics of attrition were similar once boot camp attrites were removed from the dataset.

C.   VARIABLES

Variables used in Chapter III are similar to the variables used in previous chapters. The variables are identical in this dataset for two reasons. To fully analyze the difference in fleet attrition to early service attrition, all variables must remain constant. If not, the analysis is subject to omitted variable bias. Additionally, identical variables are

used to compare the predictability of the two models. The same tiers and educational codes are used as well. See table 15 for a detailed analysis of the educational codes. Table 26 shows updated descriptive statistics for the fleet attrition analysis.

Table 26.   Fleet Attrition Analysis—Variable and Descriptive Statistics of Education Credentials

Variable	Description	Mean	Std. Dev.
Non-High School (HS) Grad	= 1 if educ credential "1", 0 otherwise	0.0010	0.0320
Other non-traditional	= 1 if educ credential "5", 0 otherwise	0.0016	0.0406
Correspondence school diploma	= 1 if educ credential "7", 0 otherwise	0.0011	0.0337
15 college creds or Job Corps + GED	= 1 if educ credential "8", 0 otherwise	0.0205	0.1419
Probationary HS senior	= 1 if educ credential "9", 0 otherwise	0.0000	0.0036
Adult/alternate HS diploma grad	= 1 if educ credential "B", 0 otherwise	0.0107	0.1033
Occupational program certificate/diploma	= 1 if educ credential "C", 0 otherwise	0.0000	0.0080
Associate's degree	= 1 if educ credential "D", 0 otherwise	0.0045	0.0675
GED	= 1 if educ credential "E", 0 otherwise	0.0203	0.1410
HS diploma but failed exit exam	= 1 if educ credential "F", 0 otherwise	0.0007	0.0273
Home schooled	= 1 if educ credential "H", 0 otherwise	0.0074	0.0861
Attendance-based HS diploma	= 1 if educ credential "J", 0 otherwise	0.0012	0.0347
Bachelor's degree	= 1 if educ credential "K", 0 otherwise	0.0063	0.0794
HS diploma grad	= 1 if educ credential "L", 0 otherwise	0.5203	0.4995
Enrolled in other than HS program	= 1 if educ credential "M", 0 otherwise	0.0096	0.0976
Master's degree	= 1 if educ credential "N", 0 otherwise	0.0003	0.0181
Traditional HS senior	= 1 if educ credential "S", 0 otherwise	0.3916	0.4881
Post-baccalaureate	= 1 if educ credential "U", 0 otherwise	0.0000	0.0036

Variable	Description	Mean	Std. Dev.
Post-baccalaureate	= 1 if educ credential "W", 0 otherwise	0.0001	0.0105
Nat'l Guard Youth Challenge	= 1 if educ credential "X", 0 otherwise	0.0019	0.0443

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

The reference person is a 19-year-old white male, with a Tier I educational credential, no dependents, an AFQT percentile score of 62, who enlisted in the Marine Corps in FY 2003. The specified model is the same as model (1) presented in the Methodology section. However, here, Model (1) is estimated with the subsample of Marines who survive boot camp.

Table 27 shows all descriptive statistics of the specified model.

Table 27.   Fleet Attrition Analysis Model 1—Variable and Descriptive Statistics

Variable	Description	Mean	Std. Dev.
Attrite	= 1 If attrite from USMC, = 0 if otherwise	0.2244	0.4172
AFQT	= AFQT score, continuous variable from 31–99	61.90	18.59
Female	= 1 if enlistee was female, = 0 otherwise	0.0643	0.2453
Single with Dependents	= 1 if marital status is "single" and dependents >= 1, 0 otherwise	0.0046	0.0679
Married with no Kids	= 1 if marital status is "married" and dependents < 1, 0 otherwise	0.0314	0.1745
Married with Dependents	= 1 if marital status is "married" and dependents >= 1, 0 otherwise	0.0032	0.0567
Age	= Age of enlistee at the time of enlistment	19.06	2.311
Black	= 1 if enlistee was Black or African American, = 0 otherwise	0.0648	0.2462
Asian	= 1 if enlistee was Asian, =0 otherwise	0.0173	0.1304

Variable	Description	Mean	Std. Dev.
Asian Pacific Islander	= 1 if enlistee was Native Hawaiian or Pacific Islander, = 0 otherwise	0.0047	0.0683
Native	= 1 if enlistee was American Indian	0.0090	0.0687
Other race	= 1 if enlistee did not respond	0.1589	0.3656
Old Tier II	= 1 if enlistee's education code was in Tier II, under old classification, =0 if otherwise	0.0338	0.1808
Old Tier III	= 1 if enlistee's education code was in Tier III, under old classification, =0 if otherwise	0.0010	0.0321
Fiscal Year 2004	= 1 if entered the USMC in fiscal year 2004, =0 if otherwise	0.2015	0.4011
Fiscal Year 2005	= 1 if entered the USMC in fiscal year 2005, =0 if otherwise	0.2097	0.4071
Fiscal Year 2006	= 1 if entered the USMC in fiscal year 2006, =0 if otherwise	0.2207	0.4147
Fiscal Year 2007	= 1 if entered the USMC in fiscal year 2007, =0 if otherwise	0.1586	0.3653

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

In this section, three models were developed to analyze fleet attrition by education credential. In the first model, the education credentials are grouped into tiers used prior to moving home-schooled individuals to Tier I status as shown in Table 28. The second model is similar to the first model and utilizes the same base variables. However, the second model reflects the home school education variable being placed into Tier I status. Table 28 shows the variable and descriptive statistics for model 2.

Table 28.   Fleet Attrition Analysis Model 2—Variable and Descriptive Statistics of Education

Variable	Description	Mean	Std. Dev.
Attrite	= 1 If attrite from USMC, = 0 if otherwise	0.2244	0.4172
AFQT	= AFQT score, continuous variable from 31–99	61.90	18.59
Female	= 1 if enlistee was female, = 0 otherwise	0.0643	0.2453
Single w/Depend	= 1 if marital status is "single" and dependents >= 1, 0 otherwise	0.0046	0.0679
Married w/no Kids	= 1 if marital status is "married" and dependents < 1, 0 otherwise	0.0314	0.1745
Married w/Depend	= 1 if marital status is "married" and dependents >= 1, 0 otherwise	0.0032	0.0567
Age	= Age of enlistee at the time of enlistment	19.0621	2.3114
Black	= 1 if enlistee was Black or African American, = 0 otherwise	0.0648	0.2462
Asian	= 1 if enlistee was Asian, =0 otherwise	0.0173	0.1304
Asian Pacific Islander	= 1 if enlistee was Native Hawaiian or Pacific Islander, = 0 otherwise	0.0047	0.0683
Native	= 1 if enlistee was American Indian or Did not respond	0.0090	0.0687
Other race	= 1 if enlistee did not respond	0.1589	0.3656
New Tier II	= 1 if enlistee's education code was in new tier II, under old classification, =0 if otherwise	0.0263	0.1602
New Tier III	= 1 if enlistee's education code was in new tier III, under old classification, =0 if otherwise	0.0010	0.0321

Variable	Description	Mean	Std. Dev.
Fiscal Year 2004	= 1 if entered the USMC in fiscal year 2004, =0 if otherwise	0.2015	0.4011
Fiscal Year 2005	= 1 if entered the USMC in fiscal year 2005, =0 if otherwise	0.2097	0.4071
Fiscal Year 2006	= 1 if entered the USMC in fiscal year 2006, =0 if otherwise	0.2207	0.4147
Fiscal Year 2007	= 1 if entered the USMC in fiscal year 2007, =0 if otherwise	0.1586	0.3653

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

D.   RESULTS

1.   Fleet attrition Analysis by Education Tiers

The results of the first model, shown in Table 29, confirm that being female with dependents, married or single, increases the probability of attrition. However, the probability of a female not completing the first-term of enlistment decreases significantly once the female enlistee has completed boot camp. Also, Blacks and Native Americans have a higher probability of completing their initial service contract when they have completed boot camp when compared to the base ethnicity.

Education tiers and AFQT scores were all significant variables. As hypothesized, Tier II and Tier III individuals had higher attrition rates than Tier I enlistees. However, when these results are compared with results displayed in Chapter IV, individuals who hold Tier II and III credentials attrite at a lower rate once they have completed boot camp. Therefore, the tier classification system is a better predictor of fleet attrition as opposed to overall first term attrition that includes attrition from DEP or boot camp.

Table 29.   Fleet Attrition Analysis—Regression Results Using Old Education Tiers

Variables	Probit Coefficients	Partial Effects
AFQT	0.0012***	0.0004***
	(0.000)	(0.000)
Female	0.1263***	0.0383***
	(0.013)	(0.004)
Single with Dependents	-0.1662***	-0.0451***
	(0.052)	(0.013)
Married with no Dependents	-0.2014***	-0.0542***
	(0.019)	(0.005)
Married with Dependents	-0.1940***	-0.0520***
	(0.060)	(0.015)
Age	0.0062***	0.0018***
	(0.001)	(0.000)
Black	-0.1106***	-0.0309***
	(0.013)	(0.004)
Asian	0.0308	0.0091
	(0.024)	(0.007)
Asian Pacific Islander	-0.1282***	-0.0354***
	(0.048)	(0.012)
Native American	-0.2433***	-0.0638***
	(0.046)	(0.011)
Other	-0.8334***	-0.1828***
	(0.013)	(0.002)
Old Tier II	0.1324***	0.0404***
	(0.018)	(0.006)
Old Tier III	0.0096	0.0028
	(0.097)	(0.028)
Fiscal Year 2004	0.1208***	0.0362***
	(0.011)	(0.003)
Fiscal Year 2005	0.2505***	0.0771***
	(0.011)	(0.004)
Fiscal Year 2006	0.1381***	0.0414***
	(0.011)	(0.003)
Fiscal Year 2007	-0.1512***	-0.0426***
	(0.011)	(0.003)

Variables	Probit Coefficients	Partial Effects
Constant	-0.9337***	
	(0.030)	
Observations	163,746	163,746
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Table 30 shows that the second model yielded minor effects to the current tier system, and in some cases, marginally worsened attrition rates.

Table 30.   Fleet Attrition Analysis—Regression Results Using New Education Tiers

Variables	Probit	Partial Effects
AFQT	0.0012***	0.0004***
	(0.000)	(0.000)
Female	0.1263***	0.0383***
	(0.013)	(0.004)
Single with Dependents	-0.1665***	-0.0452***
	(0.052)	(0.013)
Married with no Dependents	-0.2009***	-0.0540***
	(0.019)	(0.005)
Married with Dependents	-0.1931***	-0.0518***
	(0.060)	(0.015)
Age	0.0061***	0.0018***
	(0.001)	(0.000)
Black	-0.1110***	-0.0310***
	(0.013)	(0.004)
Asian	0.0302	0.0089
	(0.024)	(0.007)
Asian Pacific Islander	-0.1280***	-0.0353***
	(0.048)	(0.012)
Native American	-0.2436***	-0.0639***

Variables	Probit	Partial Effects
	(0.046)	(0.011)
Other	-0.8332***	-0.1828***
	(0.013)	(0.002)
Updated Tier II	0.1551***	0.0477***
	(0.020)	(0.006)
Updated Tier III	0.0093	0.0027
	(0.097)	(0.028)
Fiscal Year 2004	0.1208***	0.0362***
	(0.011)	(0.003)
Fiscal Year 2005	0.2503***	0.0771***
	(0.011)	(0.004)
Fiscal Year 2006	0.1381***	0.0414***
	(0.011)	(0.003)
Fiscal Year 2007	-0.1502***	-0.0423***
	(0.011)	(0.003)
Constant	-0.9325***	
	(0.030)	
Observations	163746	163746
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

When comparing the results of the two fleet attrition models shown in Tables 29 and 30, it is evident that moving the home school education code to Tier I status has lessened the predictability and significance of Tier II enlistees. When the tier classification system was modified, the goodness-of-fit did not improve.

2.   Fleet attrition Analysis by Education Credential

For the third fleet attrition model, instead of using the traditional tiers to group education codes, the education codes were separated from three groups and each credential analyzed individually. Table 31 shows the descriptive statistics of this model.

Table 31.   Fleet Attrition Analysis—Variable and Descriptive Statistics of Education Credentials

Variable	Description	Mean	Std. Dev.
Non-High School (HS) Grad	= 1 if educ credential "1", 0 otherwise	0.0010	0.0320
Other non-traditional	= 1 if educ credential "5", 0 otherwise	0.0016	0.0406
Correspondence school diploma	= 1 if educ credential "7", 0 otherwise	0.0011	0.0337
15 college creds or Job Corps + GED	= 1 if educ credential "8", 0 otherwise	0.0205	0.1419
Probationary HS senior	= 1 if educ credential "9", 0 otherwise	0.0000	0.0036
Adult/alternate HS diploma grad	= 1 if educ credential "B", 0 otherwise	0.0107	0.1033
Occupational program certificate/diploma	= 1 if educ credential "C", 0 otherwise	0.0000	0.0080
Associate's degree	= 1 if educ credential "D", 0 otherwise	0.0045	0.0675
GED	= 1 if educ credential "E", 0 otherwise	0.0203	0.1410
HS diploma but failed exit exam	= 1 if educ credential "F", 0 otherwise	0.0007	0.0273
Home schooled	= 1 if educ credential "H", 0 otherwise	0.0074	0.0861
Attendance based HS diploma	= 1 if educ credential "J", 0 otherwise	0.0012	0.0347
Bachelor's degree	= 1 if educ credential "K", 0 otherwise	0.0063	0.0794
HS diploma grad	= 1 if educ credential "L", 0 otherwise	0.5203	0.4995
Enrolled in other than HS program	= 1 if educ credential "M", 0 otherwise	0.0096	0.0976
Master's degree	= 1 if educ credential "N", 0 otherwise	0.0003	0.0181
Traditional HS senior	= 1 if educ credential "S", 0 otherwise	0.3916	0.4881
Post-baccalaureate	= 1 if educ credential "U", 0 otherwise	0.0000	0.0036
Post-baccalaureate	= 1 if educ credential "W", 0 otherwise	0.0001	0.0105
Nat'l Guard Youth Challenge	= 1 if educ credential "X", 0 otherwise	0.0019	0.0443

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

When the educational tiers are separated, the results indicate which education credentials are individually significant. Table 32 shows the results of the fleet attrition analysis. As seen here, by separating the educational codes, the similar education codes that were significant in Chapter IV, are significant to survivors. This model predicts fleet attrition better than the model with the tiers intact. The "goodness-of-fit," also known as the pseudo R-squared, increased from .0273 to .0314 when the education codes were separated.

As found in previous attrition studies, the education code of 15 college credits or Job Corps (Tier II) continues to display high attrition rates in the fleet. The enlistee who earns 15 college credits with a GED or alternative degree performs lower than many Tier II enlistees.

Similar to the analysis in Chapter IV, recruits who possess higher levels of education beyond high school show promising trends of fleet attrition predictability. The educational code with the lowest probability of attrition is the prospective enlistees who join while they are still seniors in high school (Tier I). The educational code with the highest probability of attrition is the GED (Tier II) educational credential.

Table 32.   Fleet Attrition Analysis—Regression Results Without Tiers

Variables	Probit	Partial Effects
AFQT	0.0009***	0.0003***
	(0.000)	(0.000)
Female	0.1142***	0.0344***
	(0.013)	(0.004)
Single with Dependents	-0.1717***	-0.0464***
	(0.052)	(0.013)
Married with no Dependents	-0.1734***	-0.0471***
	(0.019)	(0.005)
Married with Dependents	-0.1853***	-0.0498***
	(0.060)	(0.015)
Age	-0.0148***	-0.0043***
	(0.002)	(0.001)

Variables	Probit	Partial Effects
Black	-0.1121***	-0.0313***
	(0.013)	(0.004)
Asian	0.0307	0.0090
	(0.024)	(0.007)
Asian Pacific Islander	-0.1331***	-0.0366***
	(0.048)	(0.012)
Native American	-0.2450***	-0.0641***
	(0.046)	(0.011)
Other	-0.8294***	-0.1818***
	(0.013)	(0.002)
Less than High School	-0.0543	-0.0154
	(0.097)	(0.027)
Non traditional High School Certificate	0.2507***	0.0797***
	(0.076)	(0.026)
Correspondence Diploma	0.0611	0.0182
	(0.096)	(0.029)
1 Semester of College	0.1232***	0.0374***
	(0.023)	(0.007)
Adult Diploma	0.0020	0.0006
	(0.032)	(0.009)
Occupational Certificate	-0.6734	-0.1420*
	(0.540)	(0.073)
Associate Degree	0.0163	0.0048
	(0.050)	(0.015)
GED	0.0932***	0.0280***
	(0.023)	(0.007)
Exam Fail	-0.1506	-0.0411
	(0.122)	(0.031)
Home Study	-0.0203	-0.0059
	(0.039)	(0.011)
Attendance Certificate	0.0955	0.0288
	(0.091)	(0.028)
Bachelors	0.1621***	0.0500***
	(0.042)	(0.014)
Near Completion of High School	-0.0554*	-0.0157*
	(0.033)	(0.009)

Variables	Probit	Partial Effects
Master's Degree	-0.4194*	-0.1008**
	(0.219)	(0.042)
High School Senior	-0.1761***	-0.0504***
	(0.008)	(0.002)
1st Professional Degree	0.7912***	0.2850**
	(0.293)	(0.117)
GED National Guard Youth Challenge	0.0952	0.0287
	(0.077)	(0.024)
Fiscal Year 2004	0.1214***	0.0363***
	(0.011)	(0.003)
Fiscal Year 2005	0.2485***	0.0764***
	(0.011)	(0.004)
Fiscal Year 2006	0.1366***	0.0409***
	(0.011)	(0.003)
Fiscal Year 2007	-0.1527***	-0.0429***
	(0.011)	(0.003)
Constant	-0.4477***	
	(0.038)	
Observations	163746	163746
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Source: U.S. Marine Corps Total Forces Data Warehouse (2013).
Note: Data manipulated by STATA statistical software.

3. Summary of Results

The analyses of enlistees who have completed boot camp portray similar trends as analyses of educational credentials of individuals who attrite from boot camp. This result makes it possible to deduce that, similar to naval fleet attrition analysis conducted by Andrew, the educational tier system delivers the same inconsistencies when attempting to predict fleet attrition.[60] Even when the home-schooled education credential is moved into Tier I status, the predictability of boot camp survivors continues to decrease. When

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[60] Andrew, "Improved Screening for Navy Enlistment," 63.

educational codes are not grouped within the tier system, the predictability of first-term and fleet attrition improves. The results are strikingly similar to the results found in Chapter IV. However, a significant decrease in attrition is seen once an enlistee has completed boot camp. This outcome partially results from the fact that, by the time the enlistee has completed boot camp, a sense of duty continues to prevail to serve the enlistment contract because a good amount of time and effort has been invested into completing Marine Corps boot camp.

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VI. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

The original purpose of the educational tier system was to simplify the screening process used for prospective enlistees. The tiers allowed educational credentials of prospective recruits and military applicants to be grouped together by attrition rates based on historic performance. However, throughout the years, the performance of recruits with certain education credentials has been uneven at best. At the same time, extraneous factors, such as pressure from the GED industry or from supporters of other educational alternatives to the traditional high school diploma, have influenced the way in which educational credentials are used during enlistment screening. As a result of these outside forces and changes in the reliability of certain credentials, the tier system has become somewhat less effective in predicting attrition from military service.

1. First-Term Attrition

The Marine Corps has taken significant steps to improve the accuracy of the education tier system. In June 2012, the Marine Corps decided to shift the home school education credential from Tier II to Tier I status. Looking at the predictability of the tier system when home-school credential holders are grouped in Tier II, we see that the attrition rates of home-school credential holders are consistent with Tier I credentials. When the same sample is analyzed with home-school credential holders grouped in Tier I, the predictability of the model increases. When the results are populated with the educational credentials broken out, the predictability of the model increases.

The most significant variables in the sample are age, gender, marital status and dependency status. Each of these variables correlates to high levels of first term attrition for enlistees. Although these demographic variables are useful in predicting first term attrition, an enlistee with a traditional high school diploma is still the most useful basis for predicting first-term attrition.

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2. Fleet Attrition

When the sample was restricted to only the graduates of boot camp, much of the same conclusions are drawn from the first term attrition dataset. The shift of the home-school education credential from Tier II to Tier I also increases the predictability of fleet attrition. With home-school credential holders broken out and analyzed separately, the accuracy of the home-school education credential is significant when applied to Marines who graduated boot camp.

Similar to studies in the past, the variables found as most significant to fleet attrition were marital status and dependency status. Gender is still an important demographic in analyzing fleet attrition; however, the predictability of female attrition decreased significantly once the female Marines graduated boot camp. This is similar to studies that have analyzed gender attrition in the Marine Corps.

B. CONCLUSION

Many of the findings in this thesis are consistent with those of other researchers. Enlistees with higher AFQT scores will tend to have a lower likelihood of attrition. Also, enlistees with higher levels of education will also tend to have a lower probability of attrition. The only exception to this rule is with the evolution of many of the alternative educational credentials that have been developed over the past 20 years. For instance, the educational code listed as "some college" is incorrectly labeled and misleading. The educational code "some college" includes enlistees who did not complete high school but attended at least 15 college credits at a post-high school institution. Since these enlistees have completed 15 college credits at a post-high school institution, regardless of classes or school accreditation, they are able to shift from a Tier II status to a Tier I status. This educational code may be a way to expand the pool of Tier II enlistees. However, additional screening needs to be placed on this education credential to improve its usefulness in predicting attrition.

Similar to the findings of Andrew, the demographic with the highest correlation to attrition is being single with dependents.[61] The highest correlation is evident during fleet attrition rates.

Previous attrition research hypothesizes that the same predictors of first term attrition are constant and similar to those when applied to the survivors of boot camp who do not complete their initial service obligation. This study suggests that first-term attrition and fleet attrition are very similar, and the predictors only change slightly.

The only predictors that change slightly between first-term and fleet attrition are gender, age, and marital status. A similar correlation is found in the age variable. Enlistees over the age of 18 had high attrition rates when applied to the entire first term. However, when the sample is restricted to enlistees who are boot camp survivors, the attrition rate decreased. Once these older Marines reach the Fleet, they are more mature and more likely to complete their initial service obligation. When marital status was analyzed in the first-term attrition model, persons who were married without dependents had a high correlation to attrition. However, when the survivors of boot camp were analyzed, being married with no dependents had a negative correlation to attrition.

C.   RECOMMENDATIONS

1.   Reevaluate Educational Credentials

The education credential "8" (Tier I) actually encompasses two education credentials. The first persons covered in this group are enlistees who possess of a Job Corps certificate and are GED holders. Education credential "8" also includes persons who have completed 15 credits at a college, regardless of previous education level. Therefore, an enlistee who has dropped out of high school during the 10th grade and decides to take a few courses at the local community college will receive this education credential upon entering into the Marine Corps. This education category is also considered to be a Tier I education credential. An enlistee who has 15 college credits and high school diploma is vastly different from a GED credential holder or a high school dropout with 15 credits of postsecondary education. One can speculate that the

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[61] Andrew, "Improved Screening for Navy Enlistment," 68.

motivation or "stick-to-it-ness" of these two enlistees is somewhat different based on the overriding value of the high school diploma in predicting attrition. Therefore, within the Marine Corps Recruiting Information Support System (MCRISS) there needs to be a way to separate this educational credential into two separate categories to improve its utility in enlistment screening.

This educational credential does not distinguish between enlistees who have a GED or possess a Job Corps credential. If the educational credential is separated by individuals with 15 college credits who have a GED or Job Corps certificate, this would provide greater insight as to what is causing attrition within this credential.

2.   Dependency Status

Marine Corps Recruiting Command uses AFQT scores, education credentials and physical fitness standards as the primary means of screening prospective recruits. Characteristics such as gender, age, race, ethnicity and dependency status are known as secondary screening tools. The secondary screening devices are seldom given the same level of scrutiny as the primary screening methods. However, when it comes to the variable of dependency status, more attention needs to be given to this characteristic since it is often overlooked as a key predictor of attrition. The results show that single recruits with a dependent attrite at a rate that is 27 percentage points higher than that of enlistees without a dependent. It is recommended that a cap be placed on the number of dependency waivers a recruiting station is allowed to grant annually. Consequently, Commanding Officers at the recruiting stations would be able to determine with more scrutiny if the prospective enlistee is deserving of the dependency waiver since these individuals tend to attrite at such high rates.

3.   ScreeNing by Individual Educational Credential

Due to the wide disparity in the predictability of certain educational credentials, it is difficult to place unbounded trust in the tier system. Therefore, the Marine Corps should consider screening prospective enlistees by the individual education credential along with ASVAB and AFQT scores. The results suggest that regardless of how the

educational credentials are grouped, screening by individual characteristics could be more effective than the tier system currently in place.

D. FUTURE RESEARCH

1. Home School Education across States

The home school educational credential is now considered to be a Tier I credential under the current tier system. There is no national or federal standard that home school credential holders need to obtain to be certified as a graduated home-schooler. The standards applied to home-schooling vary from state to state. With increased participation in home-school programs, the Marine Corps is noticing a rising number of home-school accessions each year. With this understanding, it is recommended that a study be conducted on the attrition rates of home-school credential holders by geographic region, association or state. This information can be incorporated into the recruiting command market and analysis research section to determine if recruits in certain areas are producing enlistees with higher risks of attrition.

2. Non-Cognitive Screening for Tier II Credentials

The Army Research Institute has blazed a path for other services to follow when it comes to non-cognitive testing. The Army has seen success by applying non-cognitive testing to their recruiting toolkit to qualify applicants who would have been otherwise ineligible for enlistment. It is recommended that the Marine Corps examine non-cognitive factors and apply them across all potential recruits who have Tier II educational credentials. This would expand the pool of Tier II recruits and allow recruiters to utilize intangible characteristics that educational credentials and AFQT scores are not able to capture. These non-cognitive factors can be incorporated with the current screening model to predict attrition.

3. Drawdown Effects

A trend may be developing among college graduates who are willing to enlist in the Marine Corps. In 2002, the Marine Corps experienced an influx of college graduates enlisting as a result of the September 11, 2001, terrorist attacks. Now, with a still

struggling national economy, the Marine Corps is starting to see an influx similar to 2002, but for different reasons. These enlistees with bachelor's degrees are joining because the Marine Corps is currently undergoing a significant reduction in end-strength. With these cuts, the Marine Corps has been forced to scale back the number of officer accessions due to the high cost associated with producing a Marine officer versus an enlisted Marine. Therefore, it is recommended that a study be conducted determine how the drawdown has affected recruiting and first-term attrition.

E.   FINAL REMARKS

A reoccurring theme in attrition research is that the high school diploma is the most accurate predictor of first-term attrition. Several studies have attempted to find other characteristics that are highly correlated with fleet attrition. Another common theme in attrition research is that the more education an enlistee possesses, the less likely that enlistee will attrite from the service. The same theme is found when it comes to AFQT scores. The value of this thesis lies in the ability of the Marine Corps to look at other ways of expanding the pool of potentially successful enlistees without relying so heavily on education credentials.

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